ENVIRONMENTAL ATTITUDES AS EVIDENCED IN PERCEPTIONS OF TREES BY GRADUATE STUDENTS AT OKLAHOMA STATE UNIVERSITY

BY

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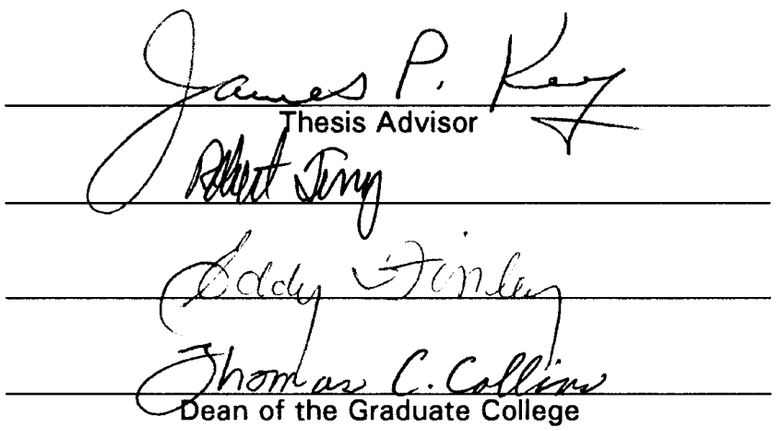

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CHAPTER I

INTRODUCTION

I know a tree, called Yggdrasil,
tall tree and sacred,
sprinkled with white clay.
Thence come the dews,
that fall in the dales.
It stands ever green,
over Destiny's spring.

-- from the ancient Norse Sagas
(Douglas, frontispiece)

These ancient lines epitomize mankind's common sense of reverence and awe before the mystery of the natural world. The sacred tree, or grove, has long been a part of mankind's consciousness in cultures throughout the world. Even when banned by the religious authorities, as happened in Israel during the time of the major prophets, the ancient groves on the hillsides still excited the spiritual imagination and allegiance of the people. The oneness with nature represented by the sacred tree is a sensibility much sought after in our own day. And its development as a cultural ideal, accessible to all and acted upon by all, is perhaps necessary to our survival as a species upon this planet.

This paper sought to review the case for an ecologically endangered world, an "at-risk" world that limits all her inhabitants. Although warnings have been sounded for at least thirty years, notably with the publication of E. F. Schumacher's Small is Beautiful in 1973, there is still an attitude prevalent in our society best summed up as "business as usual." This view was discussed and challenged. The review focused to some extent upon tropical forests. A case was made for such a concern. Finally, this paper attempted to link a necessary spiritual

consciousness to any sort of remediation of our situation, thus setting the stage for a specific review of literature regarding the measuring of attitudes about nature.

Statement of the Problem

As human life on Planet Earth moves into the second millennium of time as we reckon it, ecological devastation and widespread poverty threaten world peace and quality of life for all. Our relationship with nature has become increasingly exploitative as technology has advanced and human populations grown. This destruction is nowhere more obvious than in the world's forests. The tree is taken as symbolic of nature in cultural motifs around the world. The growth of trees is recognized as vital to the maintenance of the world's ecosystems, yet forest removal is proceeding at an accelerating pace on the planet, particularly in the vital tropical forest areas. Conservation practices that can promote sustainability of the forest resource are imperative at this juncture. Yet conservation practices may not be implemented simply because available information suggests their need. How people feel about nature may condition conservation choices as well. Beyond feelings, philosophical attitudes deriving from one's particular place in a cultural tradition may influence views of appropriate conservation measures. How these variables are related constitutes the problem of this thesis.

Purpose of the Study

The purpose of this study was to ascertain perceptions relative to the human-tree relationship as held by a random sample of graduate students enrolled at Oklahoma State University in the spring semester of 1993. Those perceptions related to: 1) strength of feelings for nature, here termed Affective, 2) preferred conservation policy, here termed Policy, and 3) adherence to a green philosophical stance (see Chapter Three for a definition of this term), here termed Philosophy.

The Knowledge of natural processes of the respondents was also tested via a True/False test.

Statement of Objectives

The general guideline objectives established for attaining the above purpose were:

1. To ascertain the personal aesthetic value or affective significance assigned to trees by the group, and each of the subgroups.
2. To ascertain the evaluation of conservation practices by the students.
3. To gauge the spiritual underpinnings in regard to nature of persons within each group of students.
4. To determine the knowledge of trees/nature by each group of students.
5. To compare the responses of students in relation to the various demographic categories established.

Based on the literature review, the following specific hypotheses were formulated:

1. Women will score higher than men in the Affective, Policy and Philosophy categories.
2. Men will score higher than women in the Knowledge category.
3. Older persons will demonstrate higher Affective, Policy, Philosophy scores, but not higher Knowledge scores than younger persons.
4. Those whose knowledge scores are high will not show higher Affective, Policy, or Philosophy scores than those whose Knowledge scores are low.
5. Respondents who profess "closeness to nature" as very valuable will have high Affective, Policy and Philosophy scores, but not necessarily high Knowledge scores.
6. Political liberals will tend to have a higher Affective score, Policy score,

and Philosophy score than political conservatives. Knowledge scores will not necessarily be higher.

7. Those who hold to strong conservative religious views will have lower Affective scores, Policy scores, and Philosophy scores than those who hold liberal religious views. They will not necessarily have lower Knowledge scores.

8. Those who identify themselves as hunters will demonstrate high Affective scores, high Policy scores, and high Knowledge scores, but low Philosophy scores.

9. Respondents from Hindu backgrounds will demonstrate higher scores on all variables than Christians.

10. Students from other countries may reveal higher scores on all variables than American students.

11. Liberal denominations will score higher in all areas than conservative denominations.

12. Agriculture students will demonstrate higher Affective scores than non-agriculture majors and higher Knowledge scores, but low Policy scores and Philosophy scores.

Assumptions

1. It is assumed that the students surveyed have had sufficient exposure to the natural world and ecological problems to respond to the questionnaire.

2. It is assumed that the students surveyed have developed their own feelings, opinions, and philosophy with respect to ecological matters sufficiently to represent these in answering the questionnaire.

Scope

1. The study was limited to a random sample of graduate students from the Oklahoma State University student body, conducted by the Office of University

Research Services during spring semester of 1993.

2. The sample size was fixed by a table for determining the needed size of a randomly chosen sample from a given finite population of N cases such that the sample proportion would be within ± 0.05 of the population proportion with a 95 percent confidence level.

Limitations

1. The various subgroups within the population represented in the sample were not sampled proportionately due to lack of ability to identify these groups within the total population.

2. Persons within the sample who had long distance telephone numbers were not interviewed.

3. Persons within the sample who could not be reached within at least six calls were not interviewed.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The purpose of this chapter was to present an overview of the material related to the subject of this study. The review of literature was divided into eight major areas and a summary. The major areas were: (1) Ecological Deterioration and Poverty, (2) The Love-Hate Relationship with Nature, (3) The Present State of the Forest Resource, (4) An Examination of Certain Western Economic Presuppositions, (5) "Primitive" Societies in Balance with Nature, (6) Getting Off the Escalator of Industrial Agriculture, (7) The Religious Dimension--Developing a Love for Place, and (8) Understanding Peoples' Attitudes in Relation to the Environment.

Ecological Deterioration and Poverty

The conjunction in time and space of two ongoing catastrophes is being increasingly recognized by citizens of earth in the early 1990's. One is the gnawing away of the planet's natural resource capital -- including the fast-receding belt of tropical forests found on every continent encircling the low latitudes of earth. The other is the abject poverty which has become the lot of millions in these same regions -- and within the industrialized countries as well. Perhaps the comprehension of the conjunction of these catastrophes is related to yet another realization. There is a growing awareness that the lives of the comfortable, in New York or New Delhi, are very much related to the working out of an equation

whose elements are impoverished farmers and diminishing natural resources, especially forest resources.

This theme is succinctly stated by Alan Durning in "Poverty and the Environment," Worldwatch Paper 92:

> When the poor, in desperation, erode hillsides, degrade rangelands, or burn forests, sending species into extinction, they are not the only ones who suffer. Soil eroding on remote mountain slopes clogs hydro-electric and irrigation works downstream. Sheets of rain washing off denuded watersheds flood exclusive neighborhoods as surely as slums. Potentially valuable medicines lost with the extinction of rain-forest species are as unavailable to the rich in their private hospitals as they are to the poor in their rural clinics. And the carbon dioxide released as landless migrants burn plots in the Amazon or the Congo warms the globe as surely as do the fumes from automobiles and smokestacks in Los Angeles or Milan. The fate of the fortunate is immutably bonded to the fate of the dispossessed through the land, water, and air; in an ecologically-endangered world, poverty is a luxury we can no longer afford (p.68).

The Love-Hate Relationship with Nature

Abuse of the earth is not something entirely new. Humankind has throughout history maintained something of a love-hate relationship with the tree, perhaps our greatest natural benefactor. J. Sholto Douglas (1976) reminds us that our first human ancestors likely appeared in a "natural orchard" sort of environment. Trees initially provided both shelter and food. For millions of years the relationship continued. Fuel from trees became an added component to the close relationship. But forests and human societies also were adversaries. The forest's dark recesses provided lairs for fearsome predators. And forests' very density limited certain of the game animals that early man depended upon for food. The trees were fired regularly to admit more sunlight, encourage grass, and provide more opportunity for successful hunting (Sauer, 1969).

The rise of grain-based agriculture in the Near East perhaps some 10,000 years ago augured further ill for the forests of the earth. Slash-and-burn methods have been used in forested areas since that time. Generally the trees grew back

after humans departed - but increasingly this became less possible. Population pressures and overgrazing by domestic animals, coupled with certain environmental factors such as steep slopes and easily eroded soils, prevented forest regeneration in many parts of the world. By the Fourth Century B.C. the stark landscape left by deforestation and ensuing erosion moved the philosopher Plato to compare the land of his native Greece to the bones of a wasted body, the soil or flesh having fallen away and the mere skeleton of the land being left (Douglas, 1976).

Unbeknown to the fledgling farmer, the erosion of genetic diversity began with her first experiments in agriculture. Neolithic farmers selected from a variety of trees to further fruits and nuts useful to them. These included in temperate areas trees such as apple, pear, apricot, peach, walnut, chestnut, pistachio, and olive (Goering, 1993). The wild progenitors of these important tree crops become rare and marginalized, pushed to hostile extremes of their native environment. Meanwhile, the favored forms of the trees, under the continuing selective process exercised by primitive farming community experiments, demonstrated less and less resistance to disease, pests, and variations in climate. In these crops, survival came to depend on the farmers. For the wild ancestral forms of the trees (valued now for their genetic variety and resistance), survival depended upon their ability to eke out an existence at the margins of their former habitats (Goering, 1993).

The Present State of Forests and Our Continuing Need for Forests

Deforestation is by no means a new story. The situation destructive of Greece's ancient forests continues into the present era. The growth of intensive agriculture, and the establishment and spread of urban areas, transport systems and industry decimated European forests, for instance. By the end of the

nineteenth century Britain had gradually reduced its native forest cover to about 6 percent of the total land area. (Bunyard, 1987). Despite its long history, deforestation is a particularly urgent story in our own day. Many developing countries are consuming their forests with alarming rapidity. For instance, the population of Central America more than doubled between 1940 and 1990, reaching 25 million. After millennia of little change to the landscape, an estimated two-thirds of the tropical rain forest disappeared during these 50 years -- and today the pace of deforestation continues on an upward curve (Chapin, 1992).

Wrecked ecosystems and devastated societies have gone hand in hand through man's tenure as agriculturalist on earth. That logical relationship was understood by the suffering people involved. The ancient Maya saying, "who cuts the trees as he pleases cuts short his own life," (Stuart, 1992, p.95) demonstrates that. In the Maya language, the same word applies for both tears and tree sap.

It is difficult to get an accurate picture of the state of the world's forests outside of Europe and North America, where at present a balance between cutting and regrowth is largely realized. According to the most recent accounting by the United Nations Food and Agriculture Organization (FAO), about 17 million hectares of primary tropical forest is being removed each year. Worldwide, over half the planet's tropical forest reserve has already been destroyed (USAID, 1992). Tropical forests are not the planet's only threatened ecosystem. They certainly do not house the majority of the world's people. But these forests provide so much that people need, directly and indirectly. In this paper as "trees" represent all of nature and its processes, so the tropical rainforests will serve as the focus of the embodiment of those trees.

Tropical rainforests are extremely productive biologically, but nevertheless very precarious ecosystems. Sahabat Alam Malaysia (1987) stated:

> Beyond the incredible local diversity and complexity of the ecosystem, the interaction of the rainforest with its environment has profound global consequences. The incredible diversity of the rainforest is a miracle of biological ingenuity. This complex association with hundreds of thousands of species of plants and more than a million species of animals is both a response to abundant rainfall and high solar radiation at the equator -- and the end product of many millions of years of evolution. During this epochal time frame the plant and animal communities have actually molded their environment to suit their own requirements...
>
> The humidity of the forest, the relative coolness of the forest floor, the extraordinary rapidity with which nutrients are absorbed back into the living system so that virtually none leaches away, the mechanisms by which the vegetation ensures its survival and propagation are the result of intricately linked factors -- all of which disappear when the forest is gone (p.492).

In terms of global climate patterns, the earth's hydrological cycle, the transfer of heat from the tropics to the poles, and the chemistry of the atmosphere are all influenced by the rainforest biota -- and the present drastic changes in that biota are bound to affect our worldwide climate. Scientists estimate that tropical forests, with only eight percent of the earth's surface, are responsible for one-third of the earth's biological activity. Hence a very considerable proportion of the earth's metabolic cycles, including photosynthesis and respiration, take place here. The Amazon Basin alone has been estimated to produce 50 percent of the oxygen added to the atmosphere annually, and consumes about ten percent of the gaseous carbon in the atmosphere (Bunyard, 1987). The rainforest is a complete and integral system, therefore a sufficient change in one component of the system is certain to ripple throughout.

For instance, consider one variable resulting from human activity, the compaction of soil, a condition brought about through clearing the forest with heavy machinery. This alters and accelerates run off, destroys the complex relationships between soil organisms -- and ultimately disturbs the balance of the system such that climate is affected. Whether those climatic changes are local or extend throughout the earth is dependent only upon the extent of the damage

(Sahabat Alam Malaysia, 1987).

One measure of our ignorance of the effect of our activities upon the rainforest -- and the planet -- is the difference in estimates of the destruction. Figures developed by the U.S. Office of Technology Assessment indicate that the earth loses more than 11 million hectares of tropical forest to land clearing every year (Landeck 1992). This figure is 35 percent lower than the FAO estimate above. Even so, that is approximately equal to the land area of Pennsylvania -- or the entire nation of Honduras, Benin, or Bulgaria.

Since people's need for and dependence upon trees as symbol of environmental balance is the theme here, it is noteworthy that 32 nations are smaller than the area of tropical forest eliminated in just one year by this OTA estimate. That includes a considerable number of people. And people and their demand for resources continue to expand. In strictly tree-commodity terms, world demand for fuelwood is projected to be 30 percent greater in 50 years than the present consumption level. And demand for paper, veneer and sawn timber is projected to double over that time period (Landeck, 1992).

The data are sobering. However, the situation is not hopeless. It simply calls for another look. A look back at the "old" could prove beneficial in terms of both models for appropriate technology and also worldview. This older worldview embodied a sense of reverence for nature as opposed to our modern sense that nature is a static feature to be exploited, directed, and conquered.

An Examination
of Certain Western Economic Presuppositions

In order to maintain an ecological balance between people and trees, certain presuppositions of modern Western culture need to be evaluated and moderated. Or perhaps, following Schumacher, these presuppositions are not to be seen as

properly "Western" but world-wide in scope, "since the whole world is now in a process of westernization" (1973, p.14).

One presupposition that our present worldview and economics is built upon is that of progress. This faith article sees the growth of human population and increasing human production and consumption of materials simply as natural, good and necessary. Unfortunately, no design to insure raw material sources or environmental integrity accompanies the myth. Part of the presupposition is that there will always be enough. The natural fecundity of the planet -- and the technical genius of mankind -- are together supposed to make for an ever enlarging future of more production, more consumption, and greater living standards.

Julian Simpson, Professor of Economics and Business Administration at the University of Maryland, has presented and defended this position in a number of articles and books. In an essay entitled, "There is No Environmental, Population, or Resource Crisis," Simpson (1990) summarized his position in regard to use of finite resources. He stated that today's Neo-Malthusians fail to recognize that, "Given some time to adjust to shortages with known methods and new inventions, free people create additional resources" (p.27).

Simpson reasoned that since the price of food, metals, and other raw materials has been declining, "as far back as we can go," then, "raw materials have been getting less scarce instead of more scarce through history" (p.27).

This is a good example of both a specialist's myopic view--and of great faith. Simpson looks to his statistics. He reasons from the direction of prices of commodities on a graph, rather than from any knowledge of natural history. He stays in his office and keeps to his pencil and computer. Simpson also betrays a confident faith in presuppositions that underlie his statistics. He presupposes that there will always be enough, simply because he thinks there always has been and wants to believe there always will be. There is no basis for this assumption, other

than his view that it has always been that way, and should be that way.

The hard fact is, natural resources are sources of limited capital, not expendable income. People, however free, do not invent oil, rain, soil, or trees. Rather, when "we squander the capital represented by living nature around us, we threaten life itself" (Schumacher 1973, p.17).

Beyond the reality that resources are finite, the cultural assumption that ever-increasing per-land-unit productivity and labor efficiency are necessarily good must be examined. Susan Carol Rogers challenged unstated American cultural presuppositions when she comes to the conclusion that an increase in productivity of agricultural land and labor is positive only under certain conditions. Were there a shortage of agricultural labor relative to society's need for agricultural commodities, or a need to free subsistence workers in agriculture to enable the proper development of an off-farm industrial/service base, then a drive to increase the productivity of agricultural land/labor would make sense. These very conditions may have described the state of affairs in the U.S. once -- but no more. According to Rogers (1987), "We now have a shortage of credit and land relative to the number of people who wish to farm, a "normal" rate of unemployment . . . and a saturated domestic market for food" (p.66).

Our present situation then makes folly the blind cultural assumption that ever-increasing agricultural productivity and efficiency are necessarily good. Rather these unquestioned cultural goals only create economic problems in the form of chronic surpluses and human tragedy related to the continued reduction in the number of farms and farmers able to provide for their families in a productive agriculture (Rogers, 1987).

The tendency in our culture, however, is not only to view this "progress" as good -- but as intrinsic to the nature of agriculture. Marty Strange (1984) argues against, "the dispassionate jargon of political economists that makes the unwanted

seem necessary," (p.120). There is no economic imperative which determines the form of agriculture. There is only the biological imperative -- the very factor that is neglected as declining soil fertility and erosion are temporarily compensated for by chemical inputs, as natural plant/insect associations are subverted by another set of chemicals, etc. Strange suggests that an economic system is not absolute in itself. It is simply a social device, a means of organizing productive resources so that they serve economic ends. Our agricultural economy is not larger than life and immutable; it is merely a function of our own cultural outlook and social values. Strange protests that we can, in fact, have the sort of economy we want. And the purpose of public policy (law) is to shape the economy so that it fulfills those economic expectations while conserving the environment, which is the real capital with which we must work.

Strange challenges citizenry to force changes in public policy that now grant a competitive edge to expanding farms; farms that are able to substitute capital for experience and expertise. He stated:

> The conditions we have in American agriculture, in which a minority of the farms (about 5 percent) produce over half the food by operating at a size that exceeds technical economies of scale, would be unaccommodated in an agriculture built on principles of sustainability. The present agriculture serves the 5 percent with policies that strangle the 95 percent. It forces every farm to grow, by granting a competitive economic advantage to expanding farms. It minimizes the risk of expansion by offering price support programs pegged to volume of production, without meaningful limits on production. It offers tax subsidies to those who invest in new machinery before old machinery is depreciated. It provides emergency credit to bail out those whose fool-hardy, debt-supported expansion causes them to fail financially" (1984, p.120).

Strange's objective here is to educate people to the possibility of a more rational public policy regarding agriculture. He sees smaller farms as part of a solution to our society's problem of wholesale destruction of natural resources and an increasingly unhealthy rural community. He would simply have us cease to prop up large farms that in all likelihood could not function without government

support. His challenge: "Let us see if big farms prevail in an economy not biased in their favor. Let us see who survives in an agriculture designed for sustainability" (1984, p.125).

This challenge relates to that other myth that must be confronted were we to salvage agro-ecosystems and human societies--the faith-claim that "bigger is better." A parallel to the human situation regarding the planet and its proper management, and a certain person and her proper management of a smaller-scale project, is discussed by Tracy Ehlers in an article entitled "The Matrifocal Farm." Ehlers focuses on the response of women to personal catastrophe as when the death or injury of a spouse abruptly thrusts the "farmer's wife" into the role of farm manager. The tragic nature of the woman's entry into the role of manager is made more difficult by the likelihood that she probably lacks the experience in decision-making, field-work, and farm-management experience that the role requires. In the face of their self-perceptions as vulnerable in their new role, women typically move quickly to develop networks of reliable assistance, advice, and mutual aid. Women in these circumstances also make changes in management style and operation that are appropriate to their status as novice farmers. In other words, women operators cut back, hone down, and concentrate their energy and resources. They do not follow in the general pattern of capitalized farming and seek to expand their operation; they do not intend to produce more. An interesting consequence of this conservative approach may emerge, as the following story relates:

> For years, Sophie's husband, Adam, had juggled the management of two separate dairy herds with custom harvesting (for cash) in three counties. They worked seven days and nights a week to improve their cash flow, but still herd management was slipshod, costing them thousands in lost calves and unproductive cows. And the family never saw Adam. Her husband's accident forced Sophie to make some changes to allow them to stay in business. This she did gladly by refusing all custom jobs, selling weaker cows, concentrating the two herds into one, and rebuilding it... The results were impressive. In her initial ten months as a farm operator, Sophie

> brought their dairy business into the black for the first time in its eighteen-year history (1987, p.150-151).

Perhaps we, the societies that inhabit Earth, should see ourselves in much the same way. If, in fact, we find ourselves running out of resources, out of room, out of time - perhaps we need to slow down, reach out to one another for help and direction, and concentrate our energy and available resources. We may come to realize that we do not know just exactly what to do, how to proceed. We have come to place great faith in the utility of our scientific paradigm, but at times this is but a self-deceiving sleight of hand.

Such basic scientific constructs as "randomness" in nature may simply veil our limited thinking. Wendell Berry (1987), environmental thinker and holistic farmer, offers some thoughts on this subject which relate to the discussion. Berry asks whether the term "random," descriptive of movement of raindrops, molecules, or other forces of nature, describes, "a verifiable condition or a limit of perception" (p.3).

His answer to this query is that "random" in this context describes a limit of human perception. He notes that what may be taken as random within a given limit may be seen as part of a pattern when seen in a wider context. He states that, "to call the unknown 'random' is to plant the flag by which to colonize and exploit the known... to call the unknown by its right name, 'mystery,' is to suggest that we had better respect the possibility of a larger, unseen pattern that can be damaged or destroyed and, with it, the smaller patterns" (1987, p.4).

If we confront mystery in nature, then we must act very cautiously. Berry is concerned to elucidate a definition of agriculture,

> as up against mystery and ignorance-based... this is its necessary definition, just as... several kinds of ruin are the necessary result of an agriculture defined as knowledge-based and up against randomness. Such an agriculture conforms exactly to what the ancient program, or programs, understood as evil or hubris. Both the Greeks and the

> Hebrews told us to watch out for humans who assume that they make all the patterns (1987, p.5).

Global climatic changes such as acid rain with its damage to temperate forests, and loss of the ozone layer in the atmosphere with profound implications for all life, are simply not well understood. Rather, these problems involve a good deal of mystery. What is clear is that man's activities in all parts of the globe are altering atmospheric chemistry and disturbing balances which have been elaborated on earth through millions of years of evolution (Sahabat Alam Malaysia, 1987).

"Primitive" Societies in Balance with Nature

One gets the impression reading Simpson and the "Cornucopian" point of view that people and nature are two distinct entities, and that the latter is not only presumed to be inexhaustible, but also valued only insofar as it serves the production interests of mankind. It would be a sad mistake though, to suppose that we humans are alien to this complex web of life, that we stand outside its both vast and most intimate of processes. Integral to the most pristine of forest ecologies is another dimension of life -- the human dimension. Remnant communities of tropical forest folk survive in today's world, including the Miskito of Honduras, and the Mbuti of the African Congo Basin. But all Earth's habitable ecosystems have been called home by some group of hunter-gatherers or primitive horticulturists at some point in history. And all these groups have maintained an economy consonant with the ecology of the area which is their home. They hunt, fish, and forage for a multitude of edible and medicinal plants in the forest. They may also clear very small areas, or partially clear them leaving many trees standing, in which to plant a profusion of plants which serve their needs.

The tropical rainforest stores nutrients primarily in the biomass of the forest

itself. Leaves and litter are quickly broken down and nutrients pumped back into living plant tissue, chiefly through the work of a host of fungi symbiotic with the plant's roots. The fungi of many species benefit from this association by receiving food manufactured by the green plants. The green plants, from shrub to towering forest giant, benefit from the effective and nearly immediate nutrient recycling that is the genius of the fungi (Chapin, 1992).

That greenery is deceptive, however, in that the underlying soils tend to be coarse, acid, and infertile. Thus when the vegetation is cleared for agriculture of any form, the basic nutrients quickly are leached from the coarse soil in this region of high temperatures and heavy rainfall. Within just a few years, the land becomes unproductive and unsuitable for agriculture (Chapin, 1992).

The native communities of tropical rainforest areas well understood this situation. Their response was to follow a nomadic sort of existence, clearing and burning the slash every few years in order to make use of the accumulated store of nutrients available in the forest biomass. Old and abandoned plots were left to revegetate and return to trees and a natural state of fertility. These were occupied again in a regular, but lengthy cycle.

People indigenous to the tropical forests of the world for thousands of years have followed this basic pattern. Their intimacy with the capacity of the forest to provide for their needs includes the knowledge of when and where to clear, burn, and plant anew. But their low population densities and frugal appetite for material things did not tax the resources of the forest. In fact, their activities made for a wealth of niches in a complex tapestry of mature trees, second growth, and overgrown fields.

Getting Off the Escalator of Industrial Agriculture

What of ourselves? Can we, all 5.2 billion of us, return to the rainforest?

Obviously not. But can we begin to get ourselves off this escalator of progress?

Jack Vail (1992), writing in The Land Report, supposes that we have much to learn from the down-to-earth life of peasant generations before us. Such rapport with those who knew of a sense of place and a natural pace has:

> much to teach us as we confront the limits of the earth. Our ways of seeing will change as we slow down and dig in. We will recognize that we have always lived within physical and moral limits, and that we always will . . . We will realize that we must not let the lessons of the wild and of our forebears get trampled over by the quickening march of progress. Rather, as our compassion for the earth enlarges, we will gather the historical debris that remains, compost it, and incorporate it into our gardens (p.24).

That last line makes it sound perhaps too easy. But if we could come to collectively understand how technology and the capital behind it can destroy both landscape and local community, we might begin to act collectively to moderate the influence of capital/technology in agriculture, including our dealings with trees.

The place to begin is to understand that modern civilization has not, "emancipated itself from dependence upon nature" (Schumacher, 1973, p.104). This sort of humility is what Wendell Berry is urging in his "Letter to Wes Jackson." He would define agriculture humbly, as up against "a mystery." Elsewhere Berry writes, "If balance is the ruling principle and a stable balance the goal, then, for humans attaining this goal requires a consciously-chosen and deliberately-made partnership with nature (1987, p.14).

Twenty years ago E. F. Schumacher wrote, "the main danger to the soil, and therewith not only to agriculture but to civilization as a whole, stems from the townsman's determination to apply to agriculture the principles of industry" (1973, p.109).

Schumacher makes this contention because of his conviction that agriculture is something essentially different from industry. This is for him a metaphysical or spiritually-deduced differentiation, for agriculture deals with life. He stated, "Its products are the results of processes of life and its means of production is the

living soil" (1973, p.110).

This he contrasts with industry which deals with man-devised processes working in a man-manipulated environment. Industry certainly has its place in human life, but it is a different place than that of agriculture. Civilization demands the balance of the two -- and this balance is, "destroyed when people fail to appreciate the essential difference between agriculture and industry. . . and attempt to treat agriculture as just another industry" (1973, p.111).

If agriculture is to be considered only another form of industry, "then money costs and money incomes are the ultimate criteria and determinants of human action, and the living world has no significance beyond that of a quarry for exploitation" (1973, p.112).

But Schumacher writes passionately of a wider view, where "the land is seen as a priceless asset which is man's task and happiness to dress and to keep" (1973, p.112).

As opposed to a narrow view that sees agriculture only in terms of a food-production function, Schumacher sees agriculture as necessary,

> to keep man in touch with living nature, of which he is and remains a highly vulnerable part; to humanize and ennoble man's wider habitat; and (finally) to bring forth the foodstuffs and other materials which are needed for a becoming life (1973, p.113).

Therefore, Schumacher contends that rather than promote industrial practices in agriculture, resulting in greater units of production and fewer farms and farmers, governments, "should be searching for policies to reconstruct rural culture, to open the land for the gainful occupation of larger numbers of people, whether it be on a full-time or part-time basis, and to orient all our actions on the land towards the threefold ideal of health, beauty, and permanence" (1973, p.114).

So how does it happen? How can economic growth be measured and directed to produce things that reduce environmental pollution and degradation, that conserve and husband natural resources and improve life quality? There are a

number of economists working in the area of sustainability. One is Herman Daly, Senior Environmental Economist at the World Bank. Daly defines a steady state economy as a constant stock of both physical wealth and people. Rather than our current preoccupation with a continuing increase in Gross National Product, a more appropriate category comes into being -- the Gross National Cost (GNC). This is the cost of maintaining the stock of goods and services at the desired level. GNC should be minimized, but kept in line with a desirable standard of living for all. Daly sees maximization of GNP as absurd. He recognizes not only physical and ecological limits to its volume, but social and moral limits as well. He sees growth necessary at this point in history only as a temporary process necessary to move from one steady state to another. Daly sees the following as major challenges:

-- For physical and biological scientists to define more clearly the limits and interactions within ecosystems and the ecosphere (which determine the feasible levels of the steady state) and to develop technologies more in conformity with such limits,

-- For social scientists to design the institutions that will bring about the transition to a steady state and permit its continuance, and

-- For philosophers, theologians, and educators to stress the neglected traditions of stewardship and distributive justice that exist in our cultural and religious heritage (1990, p.586).

This paper was primarily concerned with the last of these challenges. Proponents of the "Deep Ecology Movement" such as George Sessions, Bill Devall, Thomas Berry, Paul Ehrlich and others stress this last dimension as of paramount importance. Their basic theme is that, somehow, people must learn to care for the environment. All of us must learn to treasure the trees, forests, and all of life around us.

Tyler Miller summed it up well:

> For several decades we have used our brains to degrade the earth's life-support systems at an accelerating pace. Our power to destroy life, including our own species, is now so great that we must use our brains and our hearts to protect and heal the earth. Making this crucial transition requires that we change our human-centered view of the world to a nature-centered one (1990, p.609).

The Religious Dimension --

Developing a Love for Place

The problem is where to go to find a vehicle for such a nature-centered view. It has been suggested in this paper that one way to get at this is to look back at "primitive" groups of people throughout human history. Hunting and gathering societies have dominated most of human history. To survive, these people had to be finely attuned to the dynamics of their particular environment.

The challenge before us is to relearn this way of viewing the world. Some suggest this can be accomplished by rediscovering a sense of place. This was a strong motivation to hunter/gatherers. They were born, lived and died in a particular place. They knew very intimately the rocks, slopes, trees, animals, and weather of that place. They were a part of the land, and it was a part of them -- hence they loved the land because it was one with them.

Colin Turnbull (1961) speaks of this love of place in his account of the Mbuti or Pygmies of the Congo -- the "forest people" as he calls them. He is surprised to find these people extremely reverent, for lack of a better word. They know the secret language of the forest and, "in return for their affection and trust, it supplies them with all their needs" (p.14). Turnbull was captivated with the relationship between the simple, unassuming Pygmies and their forest home. He wrote,

> They were a people who had found in the forest something that had made their life more than just worth living, something that made it, with all its hardships and problems and tragedies, a wonderful thing, full of joy and happiness and free of care" (p.26).

The belief and hope of the Deep-Ecology wing of the environmental movement is that when people aim to become part of a particular place or region, that place becomes a part of them, and anyone so related loves and defends the place of which he is a part. That is seen as the real "Good Life".

This is the role of religion in human life -- to mold the person in his totality towards one thing -- the good thing. Religions vary only superficially in their definition of the good; primarily they differ in the means to achieve their goals. The environmental movement presently gropes for means to mold people, searches for concrete models to develop persons, and thus bring about that love and commitment to the land that is their goal.

Michael Cohen (1988) offers an ecological mantra which he hopes will mold the person in the right way. Cohen urges each of us to recognize who we really are in the recitation of this phrase:

> I am a desire for water, air, food, love, warmth, beauty, freedom, sensations, life, community, place, and spirit in the natural world. These pulsating feelings are the Planet Earth, alive and well within me. I have two mothers: my human mother and my planet mother, Earth. The planet is the womb of my life (p.27).

Some ecologists advance the notion that this "Pygmy kind" of spirituality is only natural. E. O. Wilson (1992) contends that human beings have a natural affinity and reverence for living things. He does not see this as something that must simply be taught. It is not dependent upon socialization; it is part of the very fiber of our being, ingrained in our genetic makeup. This affinity for the natural world, "biophilia" Wilson terms it, is in his view a genetic spirituality.

Others are more cautious. While admitting that most established religions do not focus upon the human-nature relationship, Wes Jackson (1980) sees an advantage in trying to link this "native spirituality" to some formal structure already in place, a structure which already commands loyalties, or has potential so to do. Not everyone can respond to a "new" religion, environmental or otherwise.

Jackson recalls the counsel of Gandhi, the great religious leader of India. Gandhi taught that each person should work out the religious impulse within the context of his own culture. This was not an attempt to relegate anyone to any particular tradition, only to realize that working within one's culture, "enables an individual to take advantage of countless subtleties inextricably interwoven with his or her own culture without having to work at it" (p.66).

Jackson goes on to evaluate the Judeo-Christian heritage as the baseline from which an appropriate attitude toward the land will likely spring for most persons in the West. He notes that there is a strong tradition of land stewardship in this view. Another strength is in Jackson's opinion, the pliability of this tradition. Here he feels, "rules are not locked in hard and fast... evolution and, eventually, radical changes have been possible" (p.67).

By way of support for this contention, Jackson notes the tacit support for slavery that exists in the Old Testament (one might include the New Testament here as well), and yet the fact that the abolition of slavery in the U.S.A. was for many a very deeply religious battle for freedom and equality in temporal life -- based upon the religious conviction that in God's economy people were free and equal.

Another strength Jackson discerns in the Judeo-Christian heritage is the concept of eternal life. Realizing that this concept is very often truncated to mean simply an individual's reward in the hereafter, Jackson insists on the fuller theological meaning of the term. He writes, "Only by extension of the idea beyond the individual can true transcendence be experienced" (p.68).

So the vital idea of community enters. Whatever one's hopes for the hereafter, eternal life is certainly a present reality, a living now in harmony with God, with others... and within the natural context. Nothing could be more Christian.

This grounding of an environment ethic in our historical/cultural selves seems very important. Means to develop the environmental ethic need to be native to our cultural being as well as to whatever may be reality with respect to our biological being.

Jackson sounded a final thought writing: "Anything as important as an ethic cannot be written but must evolve in the mind of a thinking community" (1980). If we could just add the words "and heart" to mind in the above, perhaps that needed reverence for life and earth can really come about.

Understanding Peoples' Attitudes in Relation to the Environment

The environmental movement has become a powerful force in recent years throughout the United States and indeed the world. Thomas Arcury (1986) suggested that growing environmental knowledge and concern has been led by certain environmental issue-oriented groups such as the Sierra Club and Greenpeace. According to Geller (1985) the excitement level of the environmental movement may have peaked in the late 1960's, specifically with Earth Day 1970. But the movement continues to exert its influence, although large rallies and demonstrations no longer proliferate.

In the face of this reality, developing tools to determine peoples' attitudes about the environment has been a concern among social scientists since the 1970's. Catton (1978) noted that the voices articulating newly visible environmental problems in the 1960's were not social scientists but biologists. He stated,

> sociologists, no less than other thinking people, are still grappling with the dramatic shift from the calmer fifties, when the American dreams of social progress, upward mobility, and societal stability seemed secure" (p.42).

Catton went on to document the painful re-evaluation that took place among sociologists, as the reality of natural ecologic constraints began to impact their work. This was a considerable departure for a discipline trained in the Durkheimian norm of social purity, "i.e. that social facts can be explained only by linking them with other social facts" (p. 44). Catton delineated the implicit perspective underlying traditional sociological thought, which he labeled the "Human Exceptionalism Paradigm". Factors in this worldview included:

1. Humans are unique among the earth's creatures, for they have culture.
2. Culture can vary almost infinitely and can change much more rapidly than biological traits.
3. Thus, many human differences are socially induced rather than inborn, they can be socially altered, and inconvenient differences can be eliminated.
4. Thus, also, cultural accumulation means that progress can continue without limit, making all social problems ultimately soluble (p. 42-43).

Catton contrasted this paradigm with a new one that emerged in the writings of social scientists in the seventies. The "New Environmental Paradigm" considers study of the interaction between the environment and society as integral to the discipline of sociology. The new set of assumptions included:

1. Human beings are but one species among the many that are interdependently involved in the biotic communities that shape our social life.
2. Intricate linkages of cause and effect and feedback in the web of nature produce many unintended consequences from purposive human action.
3. The world is finite, so there are potent physical and biological limits constraining economic growth, social progress, and other societal phenomena (p. 45).

These "paradigmatic changes," if indeed they reflect reality, may well explain the continued support for environmental concerns among the general public, (Geller, 1985, p.9) even though the strongly emotional, almost carnival-like people's movement atmosphere has declined.

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attempted to employ their training in psychology to include environmental data. They felt that the resolution of environmental problems would require not only technological changes and expertise, but an understanding of and a change in attitudes and behaviors of people. They stated,

> psychology in particular could contribute to the amelioration of environmental problems by isolating patterns of maladaptive behavior, developing procedures for changing these behavior patterns, and creating the research tools necessary to evaluate the efficacy of such procedures" (p. 4).

Their paper introduced the "Environmental Concern Scale," which attempts to capture an individual's beliefs and feelings about ecology. The Wiegel's stated,

> A measure of this type could be used to explore the correlates and determinants of concern about environmental quality, to examine longitudinal shifts in public concern, and to evaluate the attitudinal consequences of environmentally oriented policies" (p. 4).

The Wiegel and Wiegel scale consists of sixteen questions focusing on a range of conservation and pollution issues. Seven of the items are stated positively, and nine are couched in negative terms. The respondent rates each question along a five-point Likert scale ranging from "strongly agree" to "strongly disagree." This scale, refined for positive item-scale and item-criteria correlations, has been one used as a basis for other samples of environmental attitudes in the intervening years.

Naturally the attention of people in sociology and psychology in the environment was reflected in a practical aspect of those disciplines, the field of education. In fact, several new journals have arisen to present research and information in this area, including the Journal of Environmental Education, Environment and Behavior, and Pathways: The Ontario Journal of Outdoor Education. Dunlay and Van Liere (1978) developed the New Environment Paradigm (NEP) scale, which is designed to measure how people feel about nature.

This twelve-item scale was then tested on two Washington State samples. According to the analysis of Geller and Lasley (1985), the findings of Dunlap and Van Liere,

> suggest that the scale is reliable (using Cronbach's alpha), valid (has acceptable levels of predictive validity and construct validity), and unidimensional (the first unrotated factor in their principal factor analysis accounted for over 60 percent of the variance in both samples) (p. 10).

To better document the work of Dunlap and Van Liere, Albrecht et. al. (1982) did a replica of the study in Iowa, sampling two groups, farmers and urban residents. Here again, the NEP scale was demonstrated to have acceptable levels of reliability and validity. However, the Iowa study did not find the scale unidimensional, but instead found multiple factors operating within the scale. When the twelve items were submitted to factor analysis in the Albrecht study, three sets of items emerged for both the farm and urban populations. These three orientations within the scale were identified as having to do with what was termed:

1. the "balance of nature"
2. "limits to growth"
3. "man over nature" (p.42)

The study went on to test for interrelationships between the derived subscales and found that each had acceptable levels of reliability as measured by Cronbach's alpha, but Pearsonian correlations between the three subscales were low. This suggested to the authors of the study that in combining all the subscales into one single scale score may result in losing valuable data, or even glossing over important differences in respondents' environmental attitudes.

They stated,

> That the growth orientations of the farmers were unrelated to their feelings about man ruling over nature suggests, for example, that acceptance of the NEP by some population groups may be piecemeal. Persons may fully endorse some elements of the New Environmental Paradigm, but fail to accept other elements. Low relationships between the subscale scores could, in fact, be an important clue to

> the different environmental program priorities and program acceptability of various population groups" (p. 42).

In addition to the Albrecht follow-up, the Continental Group (1982) used an abbreviated six-point version of Dunlap and Van Liere's 1978 measure. Here education, age, and religious commitment proved to be the strongest correlates of the NEP scale. Education correlated positively with NEP, age and religion showed negative relationships.

In another study done as a follow-up to the Catton-Dunlap-Van Liere concept, other independent variables interacting with the NEP were identified. (Arcury et. al., 1986) Here the short version of the scale (Continental Group, 1982) was employed to test the premise that,

> persons who vary in their score on the NEP scale should differ in their knowledge about.....environmental problems. Specifically, we hypothesize that the higher the individual's score on the NEP scale, the greater the knowledge and environmental problems. Further, differences in NEP score and knowledge should not be better explained by other respondent characteristics....." (Arcury et. al., 1986, p. 36).

In this study the dependent variable was knowledge about nine survey items relevant to the environment -- but it was a measure of stated knowledge, not demonstrated knowledge. The respondents simply claimed to know or not to know about the topics. The independent variables included sex, age, total family income, educational attainment and community size, along with the NEP score. Bivariate analysis (Pearson's r) was used to examine the relationship of the NEP score and other independent variables to each of the nine knowledge items and the general knowledge score. Then path analysis was employed to test a causal model of the relationship between NEP score and general knowledge (p. 36).

The NEP was found to have a significant positive correlation with each of the knowledge items and the general knowledge score. But other independent variables also demonstrated a significant positive correlation with knowledge.

Education and income correlations with knowledge were strongly positive, stronger than that of NEP and knowledge. Sex ("maleness") also had a significant positive relationship to knowledge. To a lesser extent community size correlated with knowledge scores (the more urban the community, the greater the knowledge). Finally older age correlated with knowledge scores, but this much lower than the above. Naturally, on the basis of these results, the authors question whether the NEP is anything in itself or merely an alternate measure of these other variables, especially income and education (p. 36).

To test this Arcury et. al. moved to path analysis to assess the net influence of each variable on knowledge of the environment. Beta coefficients of ($<.05$) were deemed significant in this analysis. Here, "the NEP score was found to have an independent relationship to the knowledge score with the effects of the other independent variables controlled" (p. 38). Income, education and sex (maleness) each had an independent effect on total knowledge, but neither community size nor age was seen to have a direct effect. The strongest effects on knowledge were income and education, NEP score and sex (maleness) were less and about equal. Arcury et. al. felt "reassured" that education demonstrates such a positive association upon environmental knowledge. They felt that as educational attainment increases, both within the U.S. and other developed nations -- and within developing nation populations -- knowledge of environment and hopefully positive action toward the environment would also increase. They also urged the incorporation of the teaching of values upon environmental educators, for, "basic worldview or values about how humanity fits within the physical world has a direct relationship to level of environmental knowledge" (p. 39). The authors stated, "The NEP conceptualization..... provides an alternative worldview about the environment and the place of humans within it..... Students can be introduced to this new worldview, and encouraged to adopt it....." (p. 39).

Horwood (1989) is also concerned with the concept of values and the teaching of values. His challenging premise is that, "Environmental education has failed so far to change the way our culture treats the earth" (p. 5). His opinion in regard to this perceived failure, is that the flaw in environmental education is a "neglect to teach the spiritual elements of environmental relationships" (p. 5). Further, Horwood made the claim that, "Spiritual dimensions can be taught at an effective (although simple) level without offending established religious dogmas and sensitivities" (p. 5). Horwood felt that adding intellectual, political or technical content to the environmental curriculum is not the answer. He stated, "Appealing to science to repair the damage done by misapplied past technology is a solution doomed to failure if there is no change in the disposition of the people" (p. 5). Horwood's plea to educators was to pay attention to the spiritual domain because, "it drives most of our actions. People act out of their deepest convictions and feelings far more than out of intellectual knowledge" (p. 6).

Horwood glossed over religious differences. His view was that an environmental spirituality can be infused into any religious tradition. Two spiritual insights that derive from Native American tradition that Horwood particularly espoused are the feeling that people do not really own the earth but simply sojourn upon a portion of it for a time, and the feeling that the earth is the mother of all life, and thus, all living things are intimately related to one another.

Horwood suggested that a good exercise to plant these feelings for nature is to have each student find a spot outdoors and just sit there for a time. His premise was that if strong feelings for nature, strong feelings for place are elicited and developed, that an environmental ethic or spirituality will begin to emerge within an individual. This is something that is very personal then, and cannot be "taught" in the formal sense..... It must grow. Innes (1992) also stressed developing a sense of relationship with nature. He felt that as our society lacks

direct, sensory experience with nature, so will we lack a true understanding of and responsibility for nature. He stated, "Affective feelings for nature are critical in the development of an environmental ethic" (p. 26).

Steel et. al. (1990) also voiced this strong assessment of the role of an environmental spirituality or value system in guiding decisions relative to the environment. This study explored how public perceptions of risk associated with pollution in the Great Lakes are affected by both knowledge and value orientations. Steel et. al. recognized the importance of several variables. Age, gender, occupation and other socioeconomic factors influence public attitudes. The significant thing about this study, however, was the argument that environmental risk perceptions are not primarily conditioned by socioeconomic factors, nor by general educational achievement or even specific scientific knowledge. Rather, risk perceptions were primarily influenced by political and environmental value orientations. The study compared Americans and Canadians in this regard. For Americans, the measure of adherence to the NEP (the researchers used six of the twelve questions developed by Dunlap and Van Liere (1978) to determine this) was the single largest standardized regression coefficient. The authors state, "In regard to the impact of policy-relevant knowledge on risk perceptions, we find that among Americans the knowledge indicators utilized in this study have little bearing. In fact, one of the indicators was negatively correlated with perceptions of risk..... It appears that, for Americans, environmental risk perceptions are highly influenced by ideological and environmental value orientations" (p. 344).

Summary

Ecological ruin and poverty are increasingly seen to be related concerns. Those not currently threatened by these effects will be in the future -- for earth's

resources are limited. In an ecologically endangered world, poverty as well as over-consumption are problems we can no longer afford. Humankind has long demonstrated both a love and hate relationship with the earth which nurtures us. Forests, as representative of all of nature's processes, have been both revered and removed. Tropical forests have been shown to be of particular importance in regulating earth's ecosystems. Although an accurate picture of the current devastation is difficult to come by, tropical forest removal is proceeding at an alarming pace -- with dangerous repercussions for the health of the entire planet. This fact is historically related to our Western world-view. Included are the notions that progress, defined as ever-increasing production and consumption, and the "bigger-is-better" syndrome are necessarily valid and good ways of thinking and treating both the environment and fellow human beings. Rather than continue to accept these cultural constructs by blind faith, some take another view. Economic systems are not seen as absolute and immutable, rather these are understood as devised by societies on the basis of values. Other values are being tinkered with, remodeled and fashioned. These include the belief that humankind has a genetic affinity for nature, and that this should be developed. Some suggest that the present world religions can serve as vehicles for the development of the sense of nature as a sacred gift -- which demands a stewardship built upon love of place.

Specific studies done in the area of people's perception of nature have identified what appears to be a new cultured complex of ideas in regard to the environment. However, these studies are not always in agreement. Some find that discreet demographic factors such as age, sex, religion, income, and educational attainment affect knowledge of environmental issues, several of these more positively than the New Environmental Paradigm score. These feel that environmental knowledge very positively relates to a determination to protect the

environment. Others feel that this determination is related more to political and environmental value orientations.

These studies have conditioned the intent of this paper. An attempt will be made to relate several variables to one another and to environmental knowledge, as demonstrated by a score on a True-False test presenting terminology associated with ecology and the environment, particularly having to do with trees and forestry. Demographic variables include nationality, age, sex, College within the Graduate School and denominational affiliation. Other variables include an "affinity with nature" score (Affective), and a "green philosophy" (Philosophy) score which approximates the NEP scale devised by Dunlop and Van Liere (1978). A particular attempt will be made to comprehend a person's religious views. This will be explored through questions that ask persons to categorize themselves in regards to valuing of their religious tradition, valuing a feeling of closeness to nature, describing their religious outlook along a liberal to conservative continuum, and describing their political views along a liberal to conservative continuum.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

This chapter deals with the population of the study and the procedures used to collect and analyze the data for this study. A questionnaire was developed to ascertain perceptions on a number of selected items dealing with the value of nature, particularly trees, as internalized by each respondent. Certain statistical procedures permitted a comparison of each of several groupings of the respondents as to their responses.

Population of the Study

The study was carried out from January, 1993, to May, 1993. A random sample of the January, 1993, to May, 1993, graduate students at Oklahoma State University was obtained from the Office of University Research Services. The sample size was fixed by a table for determining the needed size of a randomly chosen sample from a given finite population of N cases such that the sample proportion would be within ± 0.05 of the population proportion with a 95 percent confidence level. The number of names requested was 370 (10 percent of the spring enrollment), with another sample of 30 to use as backup.

Of this number, 143 students were contacted during the 5 week period of data collection. Seventeen names had no accompanying phone number. One hundred eleven had long distance numbers and were not contacted. Twelve people chose not to respond to the survey. Finally, 117 either were longer at the

given phone number or did not answer the phone within six tries.

The parameters of the target population was established by use of the following criteria:

1. All respondents were currently students at Oklahoma State University.

2. All respondents were enrolled in the Graduate School.

3. In terms of the demographic breakdown of the respondents, the group of students designated African were to be International Students from any country of Africa exclusive of the Arabic-speaking portions of North Africa, and also exclusive of citizens of European or Asian descent from any African nation. As it happened, two Ethiopians represented this group.

4. The group of students designated East Asian were people of ethnic Chinese background from any of the following countries: Taiwan (Republic of China), Peoples' Republic of China, Singapore, or Hong Kong, or they were to be Koreans from South Korea or North Korea or Japanese from Japan. In fact, those responding to the questionnaire included four from the Peoples' Republic of China, two from Taiwan, one from Singapore, and three from South Korea.

5. The students designated Latin American were from any Spanish or Portuguese speaking country south of Mexico, including Mexico. Two respondents were in this group, one from Costa Rica, one from El Salvador.

6. The students designated as being resident of the Mideast were from any Arabic speaking country of North Africa or western Asia, or from Israel, Turkey, Iran or Afghanistan. As it turned out, two were from Saudi Arabia, and one apiece from Jordan, Syria, Lebanon and Iran.

7. The students designated as being from South East Asia were from any country south of China and east of Bangladesh, on the Indo-Chinese Peninsula or from the nearby island states of Indonesia or the Philippines. These included two respondents from Thailand, two from Indonesia, and one from the Philippines.

8. The students designated India/Pakistan were from the Indian culture area, including India, Pakistan, Nepal, Bangladesh or Sri Lanka. Respondents included nineteen students from India and one from Pakistan.

9. The students designated USA/Canada were from either of these two countries. As it happened, 97 were from the USA and one from Canada.

10. (A rationale for these groupings is presented on page 48.)

Instrument

A survey-type instrument designed to indicate each respondent's aesthetic identification with trees/nature, preferences as to appropriate conservation policies, spiritual or philosophical underpinning with regard to nature, and scientific knowledge of trees/nature was developed by the researcher for this study. This breakdown follows a logical progression moving from feelings of personal relationship (Affective) to consciously held beliefs (Philosophy) to propensity to act (Policy). The Knowledge portion of the survey was included in order to ascertain how the above related to information at an individual's disposal, and also to avoid simply taking a person's opinion of their knowledge upon a subject as sufficient. Each statement comprising the first three categories (Affective, Policy, Philosophy) was measured on a one (1) to four (4) Likert-type scale (1 = disagree strongly, 2 = disagree somewhat, 3 = agree somewhat, 4 = agree strongly). The real limits for these categories are as follows: 3.5 - 4.0 = 4; 3.4 - 2.5 = 3; 2.4 - 1.5 = 2; 1.4 - 1 = 1. The section dealing with scientific knowledge of trees was scored differently however. Here students were instructed to mark "3" if they did not know the correct answer to the question posed. If they considered the answer false, they were to mark "2". They were to mark "1" if they supposed the answer was true.

The respondents were divided into various demographic groups for purposes

of comparison and description. These groups included divisions by sex, age, major field of study, religion, religious denomination and country of origin. The questionnaire itself was divided into four primary categories. These included questions calculated to test respondents' affective evaluation of nature, particularly of trees. The idea here was to get a picture of how close to nature a person felt - to test the strength of a personal relationship between an individual and the realm of nature, using (primarily) trees as a symbol for nature. Secondly, the questionnaire sought to record the evaluation of various conservation practices by each student. Thirdly, the study explored the spiritual underpinnings of each respondent; this was an attempt to record ideals or a philosophy of nature and how that relates to religious sensibility.

The questions on the survey (see appendix) within this area of Philosophy relate to what has been called the "Deep Ecology" movement. Tyler Miller (1990, p.613) sums up this "earth-centered" worldview with several propositions, including:

> All living species are interconnected and interdependent
>
> We are part of - not apart from - nature
>
> Every living thing has a right to exist
>
> Our role is not to dominate and control nature but to work with the rest of nature and to meet our basic needs on the basis of ecological understanding and doing as little harm to other species as possible
>
> We should protect all remaining wild ecosystems not disturbed by our activities from development
>
> The personal key to a life in harmony with nature is developing a "sense of place"
>
> The caring that flows from a "sense of place" can be your guide for action. Live your life caring about the earth and you will be fulfilled.

For the purpose of this study, a philosophy that approximates the above is termed "green". The higher a person scores on the Philosophy subsection of the

survey, then the "greener" his philosophy.

Finally, a true/false test was administered testing knowledge of natural processes, particularly in regard to the biology of trees.

Other designations were made further dividing the respondents on the basis of importance of religion to the individual, religious viewpoint, political view, and feelings toward nature. Question 32 asked the respondent to indicate whether he/she personally considered his/her religion "very valuable", somewhat valuable", or "not very valuable, non-existent, or irrelevant". This then was a measure of personal importance of religion to the individual. Question 32 asked respondents to indicate whether a feeling of closeness to nature was "very valuable", "somewhat valuable", or "not very valuable". Again, this measured importance to the individual of a variable, in this case, affinity with nature. Question 34 asked the respondent to describe their own religious outlook as "very conservative", "somewhat conservative", "somewhat liberal" or "very liberal". This response sought to demonstrate the position of the individual upon a liberal/conservative continuum. Finally, question 35 asked respondents to describe their own political views as "very conservative", "somewhat conservative", "somewhat liberal", or "very liberal".

Collection of Data

Calls were made to each of the 143 respondents over a four week period, from April 26 to May 24. The call was timed to be about eight minutes in duration, although it took longer with some International Students due to their difficulty with English. An introductory statement identified the interviewer, explained the purpose of the call, and presented a brief rationale of the study. The respondents were assured that their participation was strictly voluntary.

Analysis of Data

The following is a description of how the data was analyzed. A Likert-type scale was used in the questionnaire with categories ranging from "strongly agree" to "strongly disagree" as described above, and categories "true" or "false" also described.

A set of descriptive statistics was collected on each of the survey's questions and in relation to each of the survey's categories. These include number, mean, and standard deviation. Comparisons were made within each student group of the responses to the four categories of the questionnaire: the aesthetic value of trees as internalized by each respondent (Affective),perspectives on conservation policy (Policy), spiritual/philosophical underpinnings (Philosophy), and technical knowledge (Knowledge). These comparisons were made with the t-test, or through analysis of variance, both of which revealed significant differences between groups and categories. A further comparison between demographic groups was made in relation to responses to the certain items of the survey (items 3, 6, 15, 22) which demonstrated a relatively high degree of disagreement. These were chosen because agreement with the item was below 80 percent. Item 7, also below 80 percent agreement, was not lifted out as it did not seem as meaningful in relation to a person's feelings about nature. The comparisons were done through t-tests. Finally, certain comparisons were made between groups by creating dichotomies that were subjected to t-tests in relation to the major categories of the survey (e.g. male/female, older student/younger student, etc.).

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

In presenting the results of the survey, various demographic variables will first be introduced to give an over-all picture of the population. Then the survey items (responses 1-23) will be broken down by the four primary categories of the questionnaire. These are Affective (items 1-8), Policy (items 9-17), Philosophy (items 18-25) and Knowledge (items 36-41). Thirdly, a set of tables will illustrate the respondents' evaluation of their own feelings having to do with religious experience, closeness to nature, religious outlook, and political views. Finally, differences between religious groups and academic major groups will be highlighted.

Demographic Variables

In figure 1 we see that 86 respondents were male (60 percent) and 57 were female (40 percent).

In figures 2 and 3, age of the respondents is categorized. Figure 2 shows that 51 percent of the respondents were in their 20's, 32 percent in the 30's, 13 percent in their 40's and 4 percent in their 50's. The mean age of the 143 respondents was 31.476. Figure 3 demonstrates that there is a clear model age of 24 among the sample of graduate students. Out of 143 persons, 21 (14.7 percent) were age 24. There is a weak bi-modal pattern as well, which represents the age of 12 (8.4 percent) of the respondents, as 34.

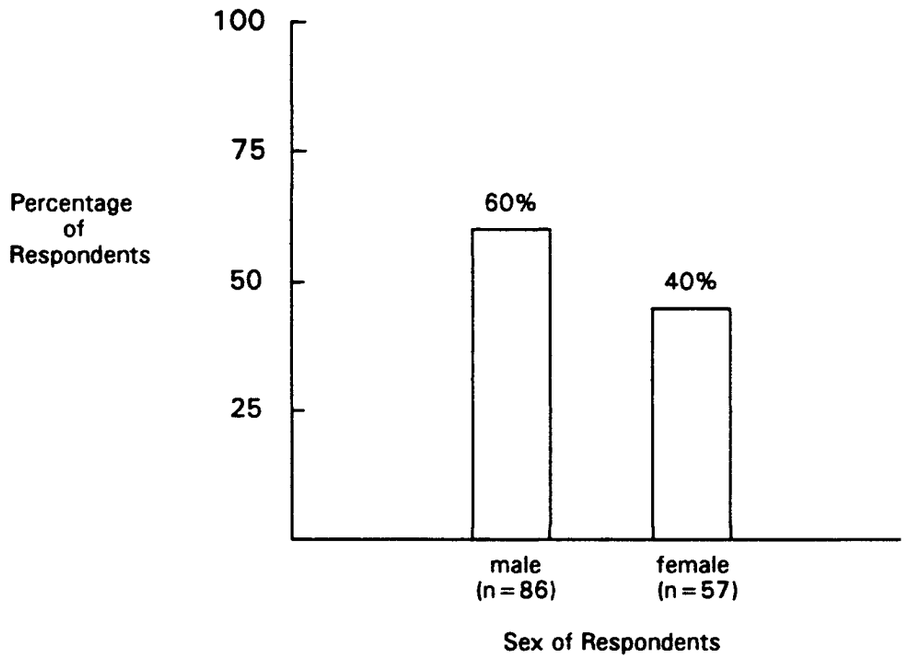


Figure 1. Distribution of Respondents by Sex

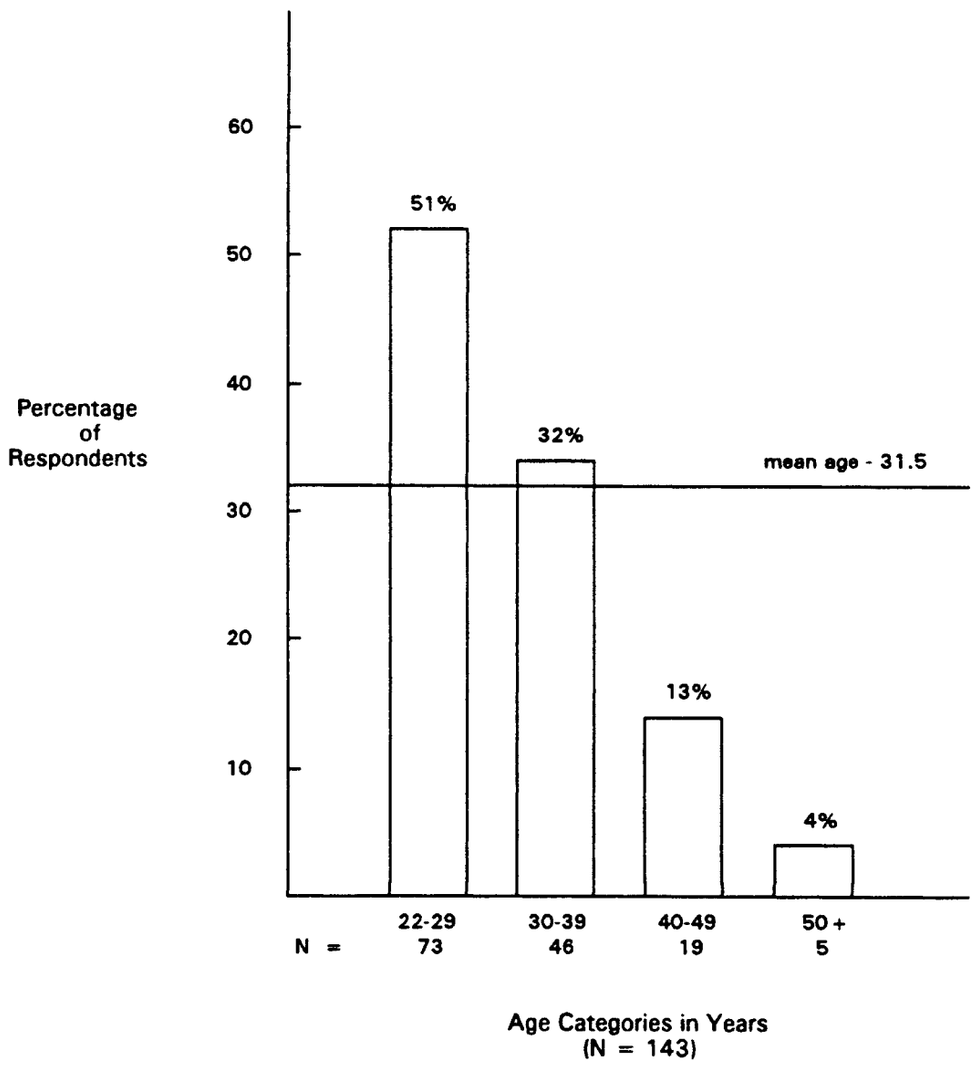


Figure 2. Distribution of Respondents by Age Categories

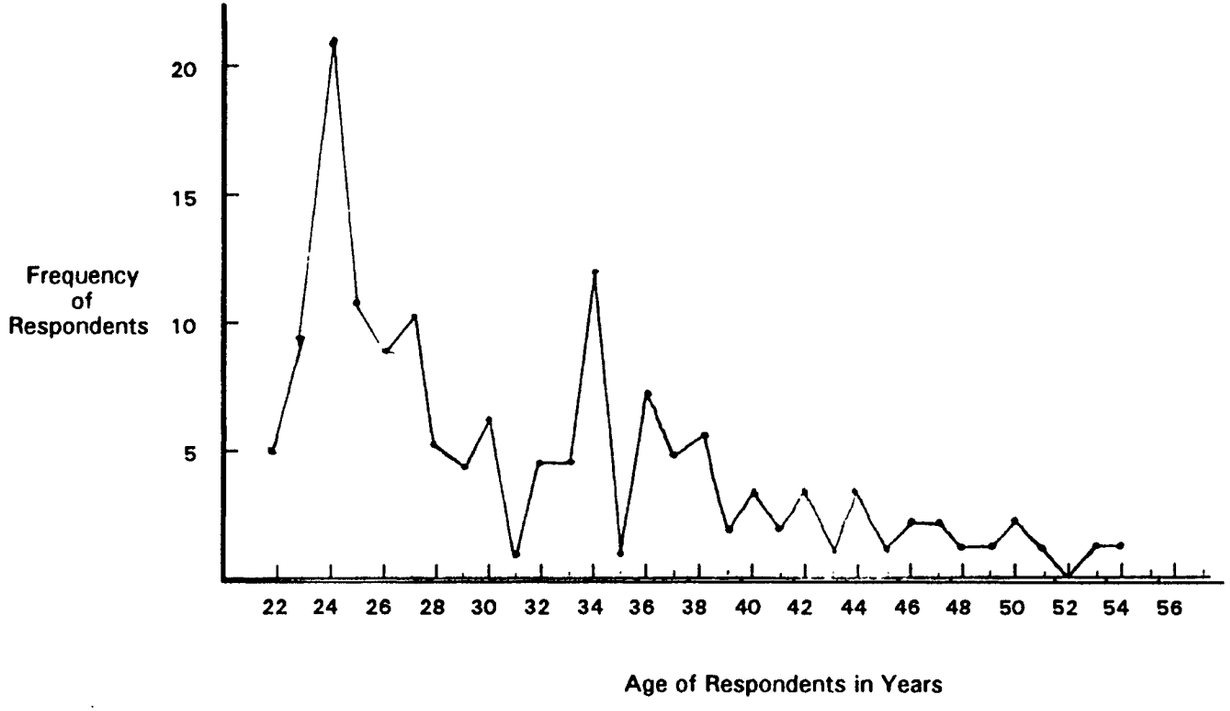


Figure 3. Distribution of Respondents by Age (Modal)

Table 1 lists the academic majors of the respondents. There were 51 majors represented among the group which comprised the study. Only 7 majors included more than 5 persons. These were Curriculum and Instruction (11 respondents), English (8), Business Administration (7), Industrial Engineering (7), Agricultural Economics (6), Electrical Engineering (6) and Chemical Engineering (6). The table lists the majors, frequency, and percentages of the total. Two respondents did not give their major. This is recorded as "missing".

Table 2 shows the majors placed into groups of my own categorization. Usually this simply follows the administrative structure of the various divisions of the University. All engineering students are grouped in Engineering, all agriculture students in Agriculture and so on. Four categories need special explanation however. These include Social Sciences which includes majors from these departments: Psychology, Geography, Sociology, and Political Science but not Economics. Economics, following the breakdown employed at Oklahoma State University, is placed with Business as are other business majors, including Accounting, Marketing, Management, and Finance. History majors are grouped with English majors. The rationale for this is that history is not a quantitative study, it is a literary/logical one as is language. This group also includes Mass Communications (journalism) and Speech. Math majors are grouped with Computer Science majors. The rationale here is that computer science is a form of applied math. Agricultural Engineering students are placed in the Engineering group rather than the Agriculture group. Table 2 lists these categories of majors employed by this study along with the number from Table 1 that corresponds to each particular academic major.

Figure 4 illustrates religious background. Here (question 29) the respondents simply indicated their religion. There were 102 respondents who indicated they were Christian (71 percent), 18 who were Hindu (13 percent), 9 who were Muslim

TABLE 1

ACADEMIC MAJORS OF RESPONDENTS

	Major	Frequency	Percent
1	Accounting	3	2.1
2	Agricultural Economics	6	4.3
3	Agricultural Education	3	2.1
4	Agricultural Engineering	1	.7
5	Agronomy	1	.7
6	Animal Science	3	2.1
7	Applied Mathematics	1	.7
8	Biochemistry	1	.7
9	Botany	1	.7
10	Business Administration	7	5.0
11	Chemical Engineering	6	4.3
12	Chemistry	2	1.4
13	Civil Engineering	2	1.4
14	Computer Science	3	2.1
15	Counseling	1	.7
16	Crop Science	2	1.4
17	Curriculum and Instruction	11	7.8
18	Design, Housing and Merchandising	1	.7
19	Economics	2	1.4
20	Educational Administration	1	.7
21	Electrical Engineering	6	4.3
22	English	8	5.7
23	Entomology	1	.7
24	Environmental Engineering	2	1.4
25	Environmental Science	3	2.1
26	Family Relations/Child Development	5	3.5
27	Food Science	1	.7
28	Forest Resources	1	.7
29	General Engineering	1	.7
30	Geography	2	1.4
31	Health, Physical Education and Leisure	4	2.8
32	Higher Education	5	3.5
33	History	3	2.1
34	Home Economics	2	1.4
35	Horticulture	1	.7
36	Industrial Engineering	7	4.9
37	Mass Communications	1	.7
38	Mathematics	4	2.8
39	Mechanical Engineering	5	3.5
40	Microbiology	1	.7
41	Natural and Applied Sciences	1	.7
42	Occupational and Adult Education	3	2.1
43	Physics	1	.7
44	Physiological Sciences	1	.7
45	Plant Pathology	2	1.4
46	Political Science	2	1.4
47	Psychology	2	1.4
48	Sociology	2	1.4
49	Soil Science	1	.7
50	Speech	1	.7
51	Zoology	4	2.8
	(Missing)	2	1.4

TABLE 2

ACADEMIC MAJORS BY MAJOR GROUP

Major Group	Specific Majors Included
Engineering	4, 11, 13, 21, 24, 29, 36, 39
Agriculture	2, 3, 5, 6, 16, 23, 28, 35, 45, 49
Education	15, 17, 20, 31, 32, 42
Social Sciences	30, 46, 47, 48
Business	1, 10, 19
Natural Sciences	8, 9, 12, 25, 40, 41, 43, 44, 51
History/Language	22, 33, 37, 50
Math	7, 14, 38
Home Economics	18, 26, 27, 34

*Specific Majors are designated by numbers corresponding to their placement on Table 1.

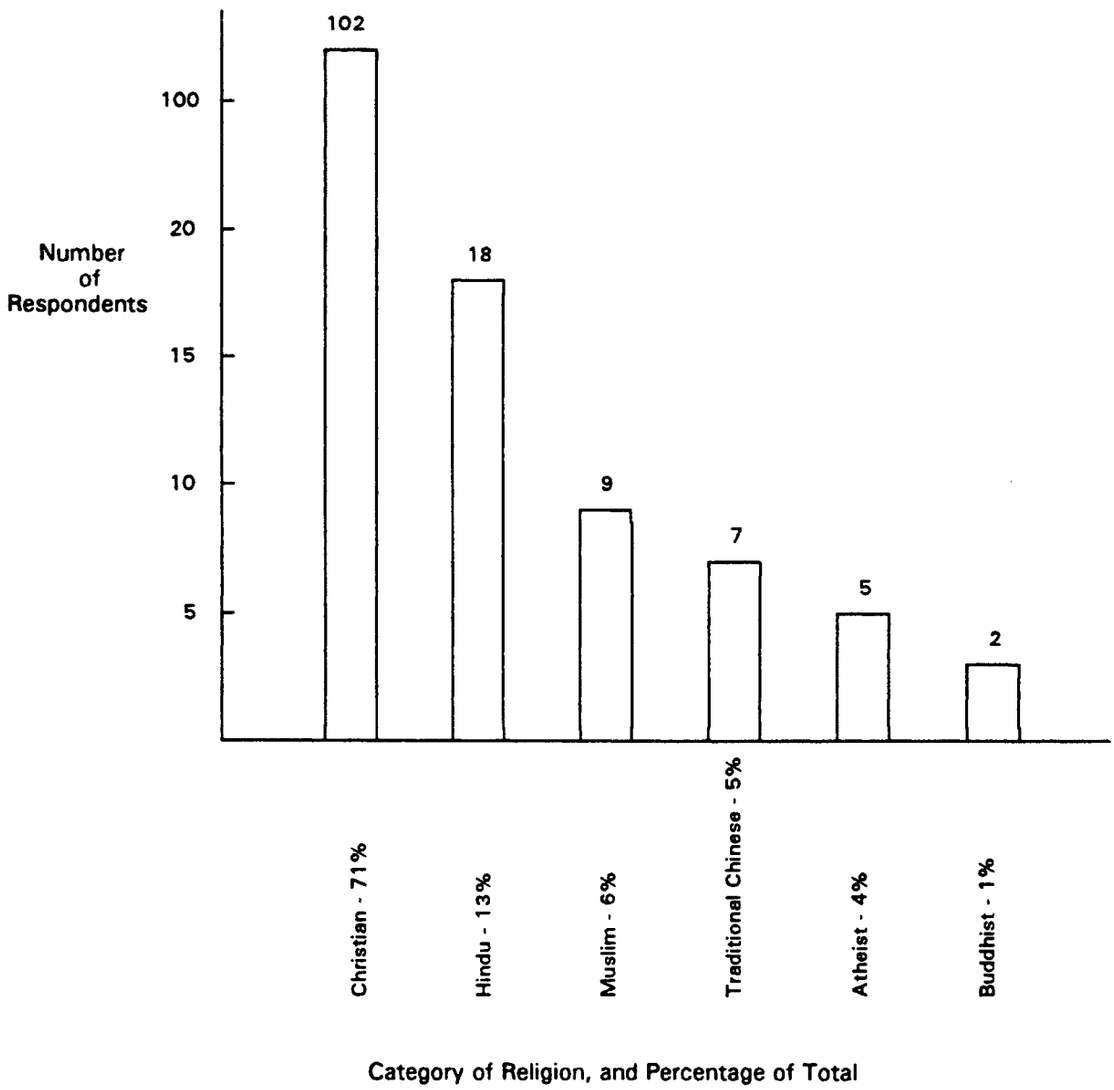


Figure 4. Distribution of Respondents by Religious Group

(6 percent), 7 who were Traditional Chinese (5 percent), 5 who were Atheist (4 percent), and 2 who were Buddhist (1 percent).

If respondents replied in answering "what is your religion?" by stating either "atheist" or "none" and were American Students, they were placed in the Atheist group. If they were Chinese and said they had no religion (as all ethnic Chinese and Koreans did except those who stated they were Christians), they were placed in the category "Traditional Chinese Beliefs". Conversation after the interview with some of the Chinese respondents indicated that they did strongly feel that they were possessed of a clearly defined ethical and appreciative value set. However, they did not categorize these guiding values as a "religion", which seemed to them to be a Western construct.

Figure 5 has to do with area of origin (Question 30). Respondents were placed within a cultural area of the author's devising. This breakdown was delineated under the heading "Population of the Study" found on page 36. Here I will defend the rationale of the groupings.

In most regional geography textbooks, Anglo-America is considered one cultural area. Hence the USA and Canada are linked in the study. They share a common history, language, economy, and ethos. India and Pakistan are considered together in that many cultural patterns of Pakistan are more Indian than Middle Eastern, even though most Pakistani's are Muslim. Islam is a comparatively recent overlay upon a very old cultural tradition here, shared with Hindu India. Koreans are placed with ethnic Chinese within a northeast Asian cultural pattern, based upon classical Chinese civilization and values.

The Latin Americans share a common colonial history, language, and religion. The South East Asian group was more culturally diverse than the others. The group was too small to be subdivided however. Respondents from the Middle East are grouped together on the basis of an arid environment, similar traditional economies and especially, a common history, religion, and except for Iran, a

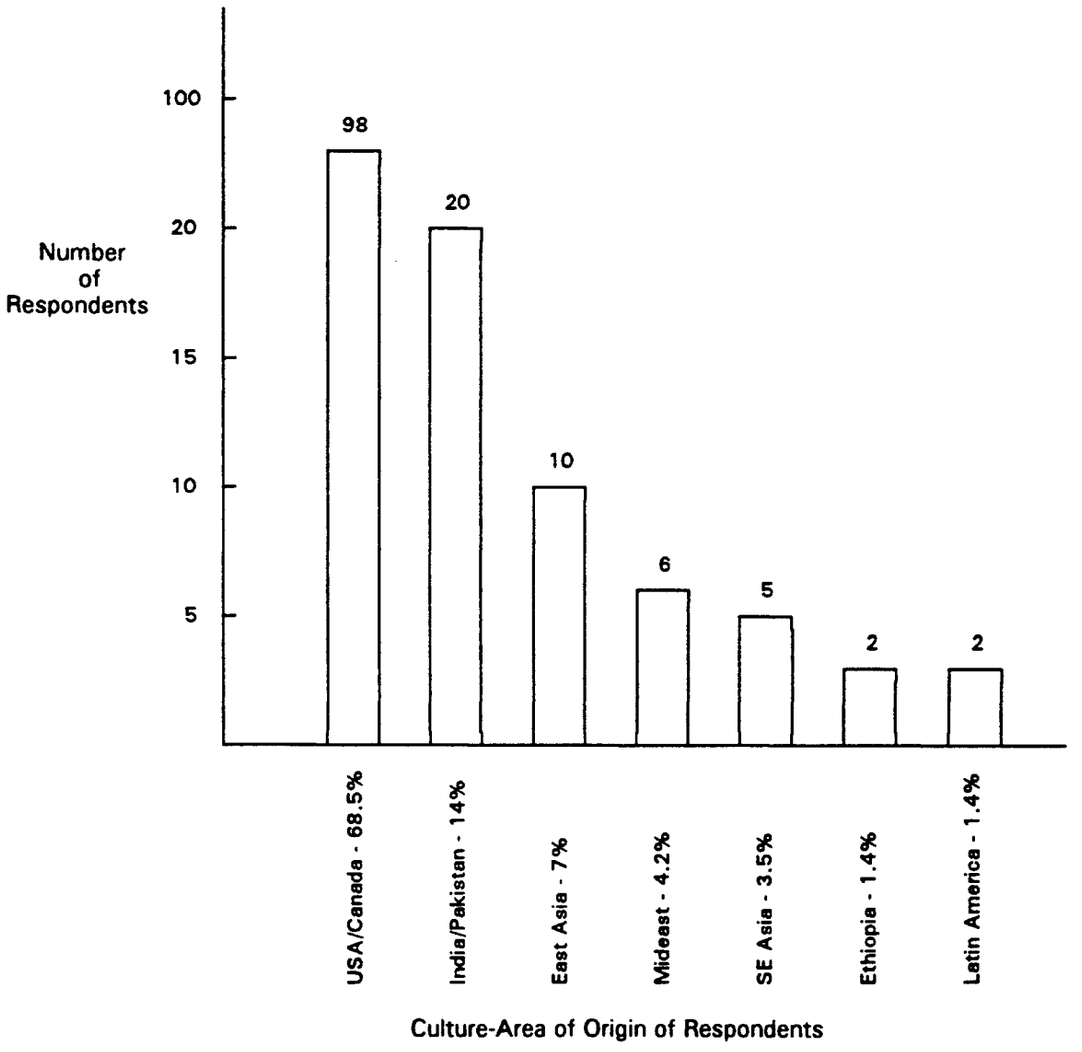


Figure 5. Distribution of Respondents by Culture Area

common Arabic language.

Figure 6 delineates Christian denomination or derivation. Respondents who were Christian stated their denomination when asked (question 31). If they had indicated their larger religious category was Christian in the question preceding, yet failed to state a denomination, they were placed in the category No Denomination. Some stated merely Protestant, some stated Non-Denominational. One stated Agnostic, and one stated Pantheist. One can readily see that this question is broader than simply assigning people a historic denomination. The categories Agnostic and Pantheist are taken to be derived from the religious stream we know as Christianity in this study. Not surprisingly here in central Oklahoma, many respondents were Baptist (16 persons), Methodist (16), or Catholic (15). These three total 47 people, which is 46 percent of those who indicated their religion was Christian, a definite plurality. Five other of the larger and more clearly defined groups (Presbyterian, Church of Christ, Disciples, Lutheran, and Christian) were lifted out for purposes of comparison, as was a conglomerate group termed Left Wing. This category included respondents who stated they were Agnostic, Christian Science, Pantheist, or Unitarian. These categories included 75 percent of the respondents. Of the groups selected for comparison then, there were 16 Baptists (11.2 percent of respondents), 16 Methodists (11.2 percent), 15 Catholics (10.5 percent), 6 Presbyterians (4.2 percent), 5 Church of Christ (3.5 percent), 5 Disciples of Christ (3.5 percent), 5 Lutherans (3.5 percent), 4 Christian (2.8 percent), and 4 in a Left Wing category (2.8 percent) which included one Agnostic, one Christian Scientist, one Pantheist, and one Unitarian Universalist. (The above Christian group refers to the loosely affiliated organization of that name, not the Christian religion.)

Figure 7 illustrates the number of persons within each major group that were involved in the study. The percentage of respondents of that major group is also listed. It can be seen that 30 of the respondents were from the Engineering

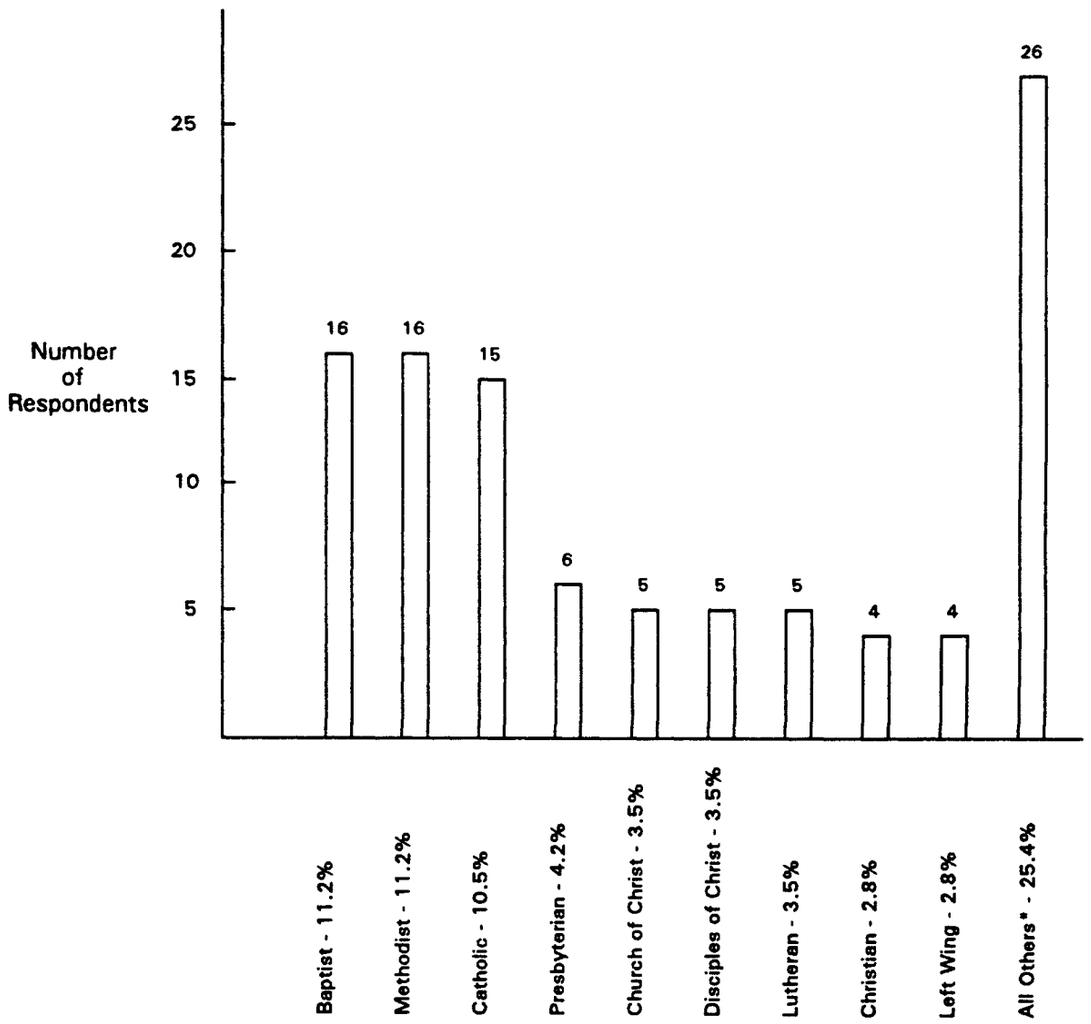


Figure 6. Distribution of Christian Respondents by Denomination

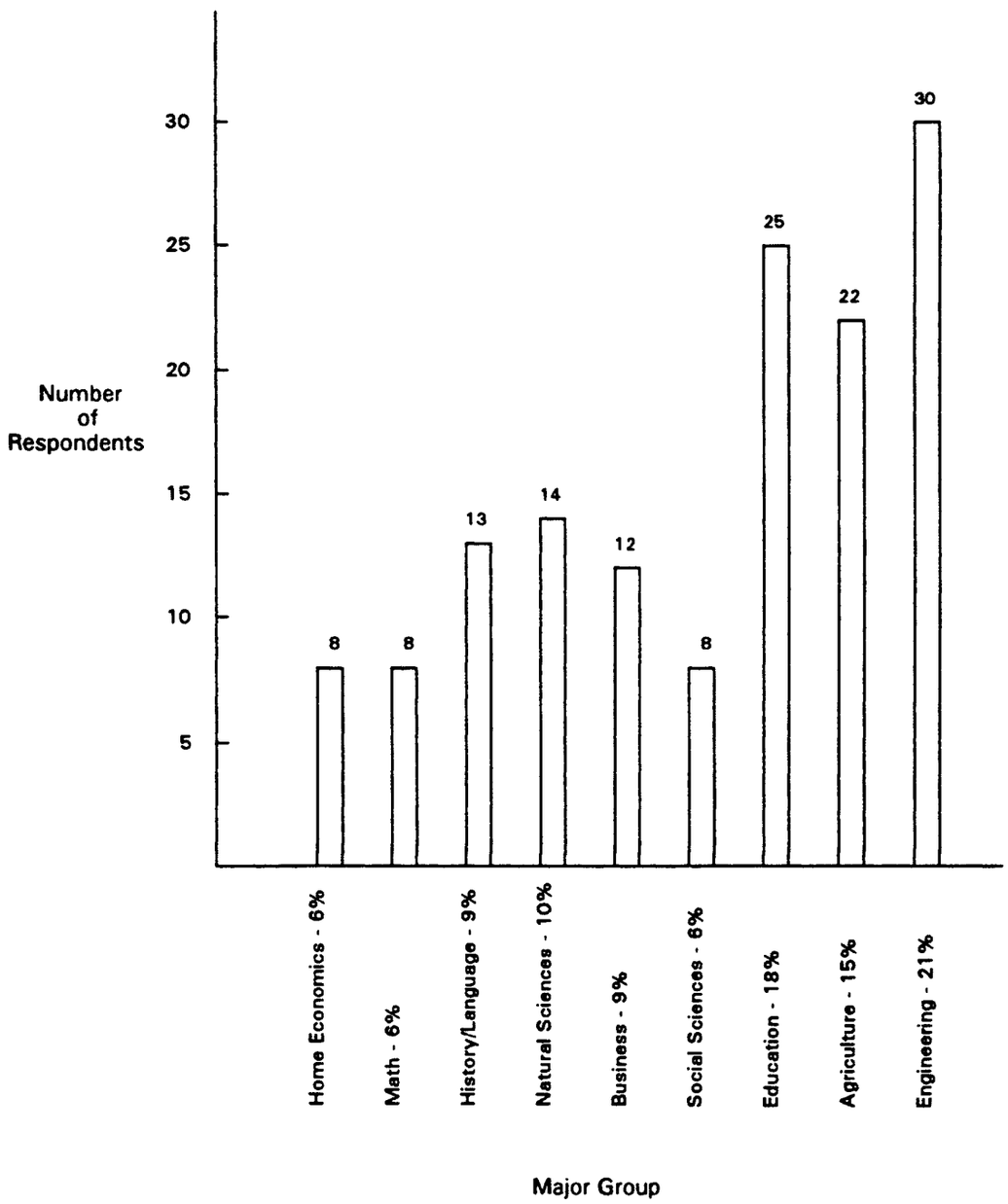


Figure 7. Distribution of Respondents by Major Group

category (21 percent), 22 from Agriculture (15 percent), 25 from Education (18 percent), 8 from Social Sciences (6 percent), 12 from Business (9 percent), 14 from Natural Sciences (10 percent), 13 from History/Language (9 percent), 8 from Math (6 percent), and 8 from Home Economics (6 percent).

The Four Primary Categories of the Questionnaire

Table 3 gives a breakdown of the eight questions asked respondents in regard to their feelings about nature, the Affective portion of the survey. Across the top of the table are the responses which might have been chosen in relation to a particular question, ranging from 4 (strongly agree) to 1 (strongly disagree). The percentage of students who chose each possibility is listed following the number of the question. The mean score of the total number of respondents for a particular question appears in the second to last column and the standard deviation for that question appears in the last column.

It may be seen that there is a strong over-all tendency to agree with the survey items (see Appendix for the specific questions). The third column across the top is the percentage of respondents who marked the item with a "4" or "3", in other words, those who agreed with the statement. In only three cases was agreement less than 80 percent. These items were selected out for further attention. In question 6, 67 percent agreed that they had sometimes considered a particular tree as an old friend, whereas 23 percent stated they had not. In question 7, 76 percent agreed that knowing the names of the common trees in the place they consider home was important to them; 24 percent stated this facility was not important to them. Question 3 also had people polarized. This statement, "A forest-based activity that I particularly enjoy is hunting" was not considered an integral part of the Affective category, thus not included in the group mean or standard deviation for this category. It was, however, asked in the midst of the Affective items. Twenty-three percent of the respondents agreed

with this item, 77 percent did not. So hunters comprise only about 1/4 of this population.

TABLE 3

SUMMARY OF AFFECTIVE RESPONSES

Question	SA 4	A 3	% Agree	D 2	SD 1	Percent Disagree	Mean Response	Category	Standard Deviation
1	71	27	98	2	0	2	3.692	SA	.507
2	68	29	97	3	0	3	3.650	SA	.534
3	12	11	23	55	22	77	3.310	A	1.040
4	73	22	95	4	1	5	3.657	SA	.629
5	52	32	84	14	2	16	3.336	A	.796
6	28	39	67	27	6	33	2.895	A	.878
7	31	45	76	18	6	24	3.000	A	.864
8	56	33	89	11	0	11	3.448	A	.689

Affective group mean 3.383

Affective group standard deviation 0.438

SA = Strongly Agree
A = Agree
D = Disagree
SD = Strongly Disagree

Standard deviations followed fairly closely the incidence of polarization discussed above, with item 6 showing a standard deviation of 0.878, item 7 at 0.864 and item 3 at 1.040.

Table 4 gives a breakdown of the nine questions asked respondents in regard to their conservation policy preferences, the Policy portion of the survey. The format of the table is the same as that of the previous table, with possible responses ranging from 4 to 1 appearing across the top of the table. Mean scores for each item and standard deviations also appear, and so do columns which sum responses in agreement and disagreement.

TABLE 4

SUMMARY OF POLICY RESPONSES

Question	SA 4	A 3	% Agree	D 2	SD 1	Percent Disagree	Mean Response	Category	Standard Deviation
9	49	40	89	10	1	11	3.377	A	.696
10	46	39	85	10	5	15	3.252	A	.835
11	68	30	98	2	0	2	3.655	SA	.520
12	82	16	98	1	1	2	3.801	SA	.466
13	73	26	99	1	0	1	3.725	SA	.463
14	61	34	95	2	3	5	3.514	SA	.712
15	25	38	63	27	10	37	2.785	A	.940
16	47	41	88	9	3	12	3.312	A	.776
17	49	44	93	6	1	7	3.423	A	.634

Policy group mean 3.4266

Policy group standard deviation 0.333

SA = Strongly Agree
A = Agree
D = Disagree
SD = Strongly Disagree

Here again, there was strong over-all agreement with the survey items. In only one instance is agreement less than 80 percent. This occurs in item 15 which states, "Government has set aside enough land for preservation". Agreement with this proposition was 63 percent and the standard deviation for the response was 0.940.

Table 5 illustrates responses in regard to the third primary portion of the survey, the philosophical stance toward nature of the participants, termed Philosophy. The table's format is identical to the two preceding tables. Here also, there is over-all agreement with the items comprising the questionnaire. In only one instance is agreement less than 80 percent. This occurs concerning item 22, "I would consider tending a garden to be a spiritual experience". Seventy three percent of respondents agreed with this statement, whereas 17 percent did not. The standard deviation for this item was 0.944.

Figure 8 illustrates the responses of the group on the True/False portion of the questionnaire (Questions 36-41). The bar graph shows the percentage of respondents who scored from zero to six answers correct on the True/False test. As can be seen, a reasonably normal curve is evident. Only 4 respondents (2.8 percent) missed all the questions, whereas only 6 (4.2 percent) scored them all correctly. The vast majority of the respondents were in the middle. In fact 78.4 percent of the respondents scored two, three, or four items correctly.

Table 6 shows the respondents' scoring of each True/False question by number, from question 36 to 41. The questions were designed to vary in difficulty. A response of "don't know" was considered incorrect. Question 36, "A leguminous tree supplies the soil with iron, a necessary nutrient" was scored correctly by 31 percent of the respondents, incorrectly by 69 percent. Question 37, "Trees serve as major storage places for carbon while supplying oxygen" was scored correctly by 90 percent of the respondents, 10 percent incorrectly. Question 38, "Most of the nutrients in a tropical rainforest are in the rich, fertile

soil which lies beneath the vegetation" was scored correctly by 28 percent, incorrectly by 72 percent. Question 39, "Tree roots form necessary working partnerships with other organisms, including many forms of fungi" was scored correctly 85 percent of the group, incorrectly by 15 percent. Question 40, "Many of the large trees of a virgin tropical rainforest produce heavy seeds or large fruits" was scored correctly by 32 percent and incorrectly by 68 percent of the respondents. Finally, question 41, "A palm tree is classified as a herbivore" was scored correctly by 54 percent of the respondents and incorrectly by 46 percent.

TABLE 5

SUMMARY OF PHILOSOPHY RESPONSES

Question	SA 4	A 3	% Agree	D 2	SD 1	Percent Disagree	Mean Response	Category	Standard Deviation
18	50	30	80	9	1	10	3.189	A	1.007
19	51	39	80	6	4	10	3.373	A	.777
20	75	24	99	1	0	1	3.738	SA	.488
21	63	30	93	6	1	7	3.552	SA	.647
22	32	41	73	17	10	17	2.951	A	.944
23	67	28	95	4	1	5	3.596	SA	.643
24	46	37	83	12	5	17	3.241	A	.853
25	43	40	83	12	5	17	3.217	A	.840

Philosophy group mean 3.3516

Philosophy group standard deviation 0.494

SA = Strongly Agree
A = Agree
D = Disagree
SD = Strongly Disagree

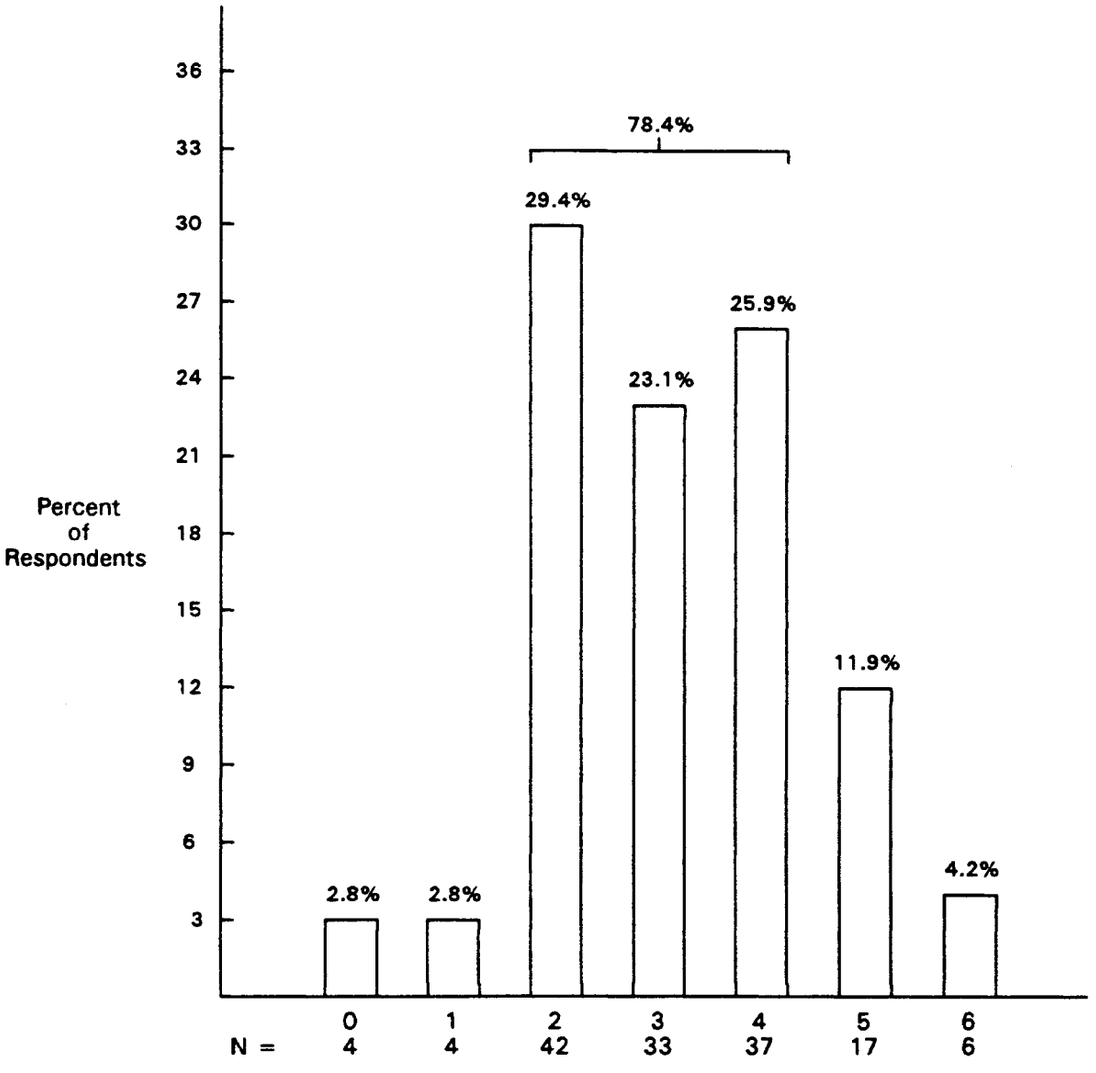


Figure 8. Distribution of Respondents by Number of Correct Responses on Knowledge (T/F) Portion of Survey

TABLE 6

TRUE/FALSE QUESTIONS ANSWERED CORRECTLY

Question #	Correct Response	% True	% False	% Don't Know	% Correct	% Incorrect
36	F	24	32	44	31	69
37	T	90	6	4	90	10
38	F	50	28	22	28	72
39	T	84	1	15	85	15
40	T	36	14	54	32	68
41	F	11	53	36	54	46

Table 7 illustrates relationships between the four primary categories of the questionnaire, Affective responses, Policy responses, Philosophy responses and Knowledge responses. A series of t-tests were performed to see whether there were significant differences from one group to another. Differences between Affective and Policy responses and Affective and Philosophy responses were not statistically significant. It can be seen that the mean of means of the responses within the Affective category is very close to that of the Philosophy category. The t-value between these groups is significant only at the 0.385 level, indicating little difference in the two. The same may be said for the evaluation of the categories Affective and Policy, although the spread of the means here is more, and the t-test shows a significant difference at the 0.126 level, indicating a bit more of a disparity between these two than the previous two categories. However, there is a statistically significant difference between responses in the Policy category and those in the Philosophy category. This t is 2.28 at the 0.024 degree of

TABLE 7

RELATIONSHIPS AMONG PRIMARY CATEGORIES

Category	Mean	SD	t-value	Probability
Affective	3.3826	.438	-1.54	.126
Policy	3.4266	.333		
Affective	3.3826	.438	.87	.385
Philosophy	3.3516	.494		
Policy	3.4266	.333	2.28	.024 *
Philosophy	3.3516	.494		
Affective	3.3826	.438	1.74	.085
Knowledge	3.1888	1.333		
Policy	3.4266	.333	2.07	.040 *
Knowledge	3.1888	1.321		
Philosophy	3.3516	.494	1.35	.178
Knowledge	3.1888	1.321		

* Probability < 0.05

confidence, well below the 0.05 level deemed significant. When Knowledge values are compared to Affective, Policy, and Philosophy values, only the Policy/Knowledge comparison is significant at the 0.05 level or below, this at the 0.04 confidence level. The Affective/Knowledge comparison t of 1.74 is significant at the 0.085 level, which is approaching significance. The Philosophy/Knowledge t of 1.35 becomes significant only at the 0.178 confidence level, which renders this relationship insignificant for this study.

Respondents Self-Evaluations

The following four tables illustrate the responses to questions 32 through 35 of the questionnaire, dealing with the US/Canada respondents only. Table 8 illustrates question 32. Question 32 asked respondents to state whether their religion was personally considered valuable. Respondents chose from the following three possibilities: very valuable; somewhat valuable; or not very valuable, non-existent or irrelevant. How respondents then valued their religion was then considered in relation to a dichotomy - those who supposed it as very valuable versus those who supposed it not valuable. This dichotomy was then compared by t-test in relation to the four categories of the questionnaire, Affective, Policy, Philosophy, and Knowledge. In all cases, there were no statistical differences between the two dichotomies.

The only comparison even approaching statistical significance (at the 0.05 level) is the one wherein those who do not value their religious experience are compared with those who consider their religious experience very valuable in terms of the Philosophy category scores. Here the mean Philosophy category score for 10 respondents not valuing their religious experience was 2.9625 - the lowest mean score by any group on this table. The mean Philosophy category scores for 66 respondents who considered their religious experience "very

valuable" was 3.3414. This comparison yielded a t of -1.43 and was significant at the 0.184 level.

TABLE 8

T-TESTS FOR SAMPLES OF QUESTION 32:
RELIGIOUS EXPERIENCE - (US/CANADA)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
not valued	10	3.3000	0.561	-0.45	0.653
very valuable	66	3.3745	0.475		
Policy					
not valued	10	3.3556	0.385	-0.32	0.750
very valuable	66	3.3949	0.360		
Philosophy					
not valued	10	2.9625	0.817	-1.43	0.184
very valuable	66	3.3414	0.509		
Knowledge					
not valued	10	3.8000	1.229	0.84	0.401
very valuable	66	3.4091	1.381		

Question 33 was tabulated in Table 9. This item asked respondents to state whether a feeling of closeness to nature was to them very valuable, somewhat valuable, or not very valuable. There was one dichotomy subjected to the t-test here, those who considered closeness to nature valuable versus those who considered it somewhat valuable or not very valuable. Markedly significant differences were apparent here for all three subjective variables, even at the 0.000 confidence level. However, there was no significant difference in these two groups as to the Knowledge component of the survey. Those who, according to their response to Question 33, value feeling close to nature scored very positively in the areas of feeling for nature (Affective), using governmental power to control natural resource use (Policy), and identification with a "Green" philosophy (Philosophy). In relation to the Knowledge portion of the survey, they were no better informed than those who did not feel close to nature. The hypothesis is accepted.

Question 34, shown in Table 10, asked respondents to state whether they would describe their own religious outlook as very conservative, somewhat conservative, somewhat liberal, or very liberal. The dichotomy tested was conservative and liberal. Again, dramatic differences emerged in the way these two groups scored all three subjective aspects of the questionnaire. Statistically significant Affective differences in scoring were demonstrated at the 0.001 level, Policy differences at the 0.000 level and Philosophy differences at the 0.011 level. Again, there were no significant differences in the two groups as to the Knowledge section of the questionnaire. The hypothesis is accepted.

Question 35 (represented in Table 11) asked respondents to state whether they would describe their political views as very conservative, somewhat conservative, somewhat liberal or very liberal. Again, the dichotomy tested by t-test was between conservative and liberal. Here only the Policy section of the questionnaire indicated a significant difference in the way these two groups

responded. This difference was significant at the 0.003 level. The hypothesis is accepted for Policy and Knowledge, but not for Affective and Philosophy.

TABLE 9

T-TESTS FOR SAMPLES OF QUESTION 33:
CLOSENESS TO NATURE - (US/CANADA)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
not valued or somewhat valued	31	2.9309	0.400	-8.56	0.000 *
valued very much	67	3.5714	0.316		
Policy					
not valued or somewhat valued	31	3.1711	0.372	-4.60	0.000 *
valued very much	67	3.5124	0.264		
Philosophy					
not valued or somewhat valued	31	2.8637	0.536	-5.93	0.000 *
valued very much	67	3.4982	0.383		
Knowledge					
not valued or somewhat valued	31	3.5806	1.385	0.61	0.542
valued very much	67	3.4030	1.315		

* Probability < 0.05

TABLE 10

T-TESTS FOR SAMPLES OF QUESTION 34:
RELIGIOUS OUTLOOK - (US/CANADA)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
conservative	46	3.2391	0.451	-3.30	0.001 *
liberal	50	3.5229	0.390		
Policy					
conservative	46	3.2720	0.347	-4.33	0.000 *
liberal	50	3.5435	0.255		
Philosophy					
conservative	46	3.2018	0.533	-2.61	0.011 *
liberal	50	3.4500	0.380		
Knowledge					
conservative	46	3.4348	1.424	0.05	0.957
liberal	50	3.4200	1.230		

* Probability < 0.05

TABLE 11

T-TESTS FOR SAMPLES OF QUESTION 35:
POLITICAL OUTLOOK - (US/CANADA)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
conservative	48	3.2887	0.429	-1.38	0.170
liberal	38	3.4211	0.455		
Policy					
conservative	48	3.2936	0.364	-3.06	0.003 *
liberal	38	3.5117	0.276		
Philosophy					
conservative	48	3.2090	0.590	-1.36	0.176
liberal	38	3.3684	0.464		
Knowledge					
conservative	48	3.4583	1.368	0.13	0.897
liberal	38	3.4211	1.266		

* Probability < 0.05

TABLE 11

T-TESTS FOR SAMPLES OF QUESTION 35:
POLITICAL OUTLOOK - (US/CANADA)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
conservative	48	3.2887	0.429	-1.38	0.170
liberal	38	3.4211	0.455		
Policy					
conservative	48	3.2936	0.364	-3.06	0.003 *
liberal	38	3.5117	0.276		
Philosophy					
conservative	48	3.2090	0.590	-1.36	0.176
liberal	38	3.3684	0.464		
Knowledge					
conservative	48	3.4583	1.368	0.13	0.897
liberal	38	3.4211	1.266		

* Probability < 0.05

Differences Between Groups

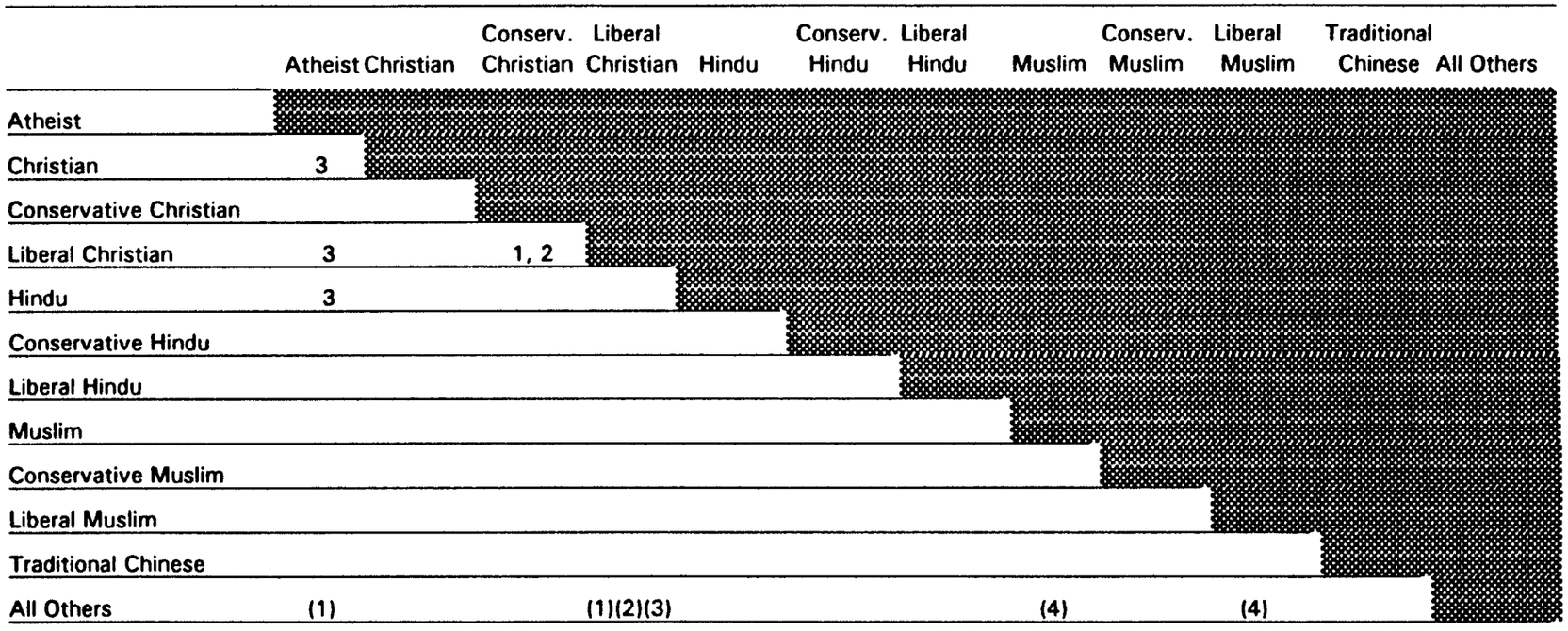
Table 12 demonstrated a series of five analyses of variances made between religious groups. (The five were made in order to accommodate all the various, sometimes mutually inclusive, subsets.) The groups are based upon responses to item 29 of the questionnaire. The basic groups include Atheist, Buddhist, Christian, Hindu, Muslim, and Traditional Chinese (see Figure 4). Buddhists do not figure in the analysis of variance because there were too few (only two). Other categories were derived from students' responses to question 34. Here people indicated whether they considered themselves conservative or liberal.

The major categories of the survey, Affective, Policy, Philosophy, and Knowledge were analyzed here by these eleven religious groups, plus a group termed All Others which was compared to each of the other eleven by a series of t-tests. In the Affective portion of the questionnaire, there was only one significant difference at the 0.05 level of confidence or less. This was between Conservative Christians and Liberal Christians. The Liberal Christians had a markedly higher Affective score indicating a much closer relationship to nature as a group. Table 13 shows the Liberal Christian mean for the Affective portion of the survey was 3.5385 compared to the Conservative Christian mean of 3.2400. Although it did not show up in the analysis of variance, the means also show a definite discrepancy between responses of Atheists (3.000) and other groups, of which the mean of means was 3.3850. The standard deviation of Atheists in the Affective area is very close to that of the entire sample, 0.4629 compared to 0.4382.

An interesting opposite showed up in relation to Liberal and Conservative Hindus and Liberal and Conservative Muslims compared to Liberal and Conservative Christians. Within the Christian group, as we have seen, the Liberal group scored the questionnaire much higher in the Affective area than the

TABLE 12

DIFFERENCES BETWEEN RELIGIOUS GROUPS



	Atheist	Christian	Conserv. Christian	Liberal Christian	Hindu	Conserv. Hindu	Liberal Hindu	Muslim	Conserv. Muslim	Liberal Muslim	Traditional Chinese	All Others
Atheist												
Christian	3											
Conservative Christian												
Liberal Christian	3		1, 2									
Hindu	3											
Conservative Hindu												
Liberal Hindu												
Muslim												
Conservative Muslim												
Liberal Muslim												
Traditional Chinese												
All Others	(1)			(1)(2)(3)				(4)		(4)		

Analysis of variance: Affective[1], Policy[2], Philosophy[3], Knowledge[4] by religious groups.

Those differing by 0.05 confidence level or below by anova have numbers corresponding to category.

Those differing at 0.05 level by t-test have numbers in parenthesis.

TABLE 13

MEANS AND STANDARD DEVIATIONS FOR RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, KNOWLEDGE CATEGORIES OF RELIGIOUS GROUPS

		◄—— 1-4 scale ——►						◄— 0-6 scale —►	
		Affective		Policy		Philosophy		Knowledge	
Religious Group	Count	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Atheist	5	3.000	0.4629	3.1889	0.4403	2.7250	0.9898	4.000	1.4142
Christian	102	3.3922	0.4498	3.4305	0.3351	3.3496	0.4731	3.3039	1.3700
Conservative Christian	50	3.2400	0.4485	3.2858	0.3403	3.2256	0.5257	3.2600	1.5093
Liberal Christian	52	3.5385	0.4037	3.5696	0.2662	3.4688	0.3850	3.3462	1.2349
Hindu	18	3.3730	0.4754	3.4978	0.3441	3.4583	0.4135	2.8889	1.1318
Conservative Hindu	4	3.6429	0.2474	3.6944	0.3782	3.4375	0.2602	3.5000	1.2910
Liberal Hindu	14	3.2959	0.5026	3.4416	0.3264	3.4643	0.4558	2.7143	1.0690
Muslim	9	3.5079	0.2955	3.4429	0.2565	3.4167	0.4330	2.1111	0.6009
Conservative Muslim	3	3.5714	0.2474	3.3889	0.1470	3.5417	0.2602	2.6667	0.5774
Liberal Muslim	6	3.4762	0.3340	3.4699	0.3066	3.3542	0.5088	1.8333	0.4082
Traditional Chinese	7	3.4286	0.1650	3.3294	0.3115	3.5000	0.4677	3.4286	0.9759
Total/Mean	141	3.3850	0.4383	3.4263	0.3347	3.3531	0.4972	3.2057	1.3230

Conservative group. Among Hindus and Muslims, the opposite is true. Although the differences were not significant, the Conservative Hindu mean of 3.6429 (Table 13) is higher than the Liberal Hindu mean of 3.2959, as is that of Conservative Muslims (3.5714) compared to Liberal Muslims (3.4762). In both cases, the standard deviation of the conservative group is low (both at 0.2474) but the standard deviation for the liberal group is high. Liberal Muslims showed a standard deviation of 0.3340, while liberal Hindus were a very high 0.5026.

In relation to the Policy portion of the survey (Table 12), significant differences as revealed by the analysis of variance emerged again between Conservative Christians and Liberal Christians, with the mean for the former at 3.2858 (standard deviation = 0.3403) and for the latter at 3.5696 (standard deviation = 0.2662) (Table 13). This low standard deviation for Liberal Christians in the Policy area indicated more unanimity of opinion than that demonstrated by Conservative Christians in Policy considerations.

Again, the Atheists had the lowest Policy score, but the difference between them and the next lowest group, the Conservative Christians, was not so marked in this Policy consideration (Atheist = 3.1889, Conservative Christian = 3.2858) as it was in the Affective sphere. For both, standard deviations were near the mean.

Table 13 indicated that Conservative (perhaps a better word would be "traditional" cf. Chapter 5) Hindus had the highest rating in the Policy area (3.6944), again higher than Liberal Hindus (3.4416). However, the pattern does not hold for Muslims. Liberal Muslims scored Policy matters higher (3.4699) than Conservative Muslims (3.3889).

On the Philosophy component of the questionnaire, the significant differences came between Atheists and Christians, Atheists and Liberal Christians, and Atheists and Hindus (Table 12). The mean score for Atheists here was only 2.7250, and 3.3922 for Christians. Liberal Christians scored this section 3.4688

and Hindus 3.4583 (Table 13). Standard deviations were 0.9898, 0.4498, 0.3850, and 0.4135 respectively.

Finally, the Knowledge part of the survey indicated no statistically significant differences when subjected to Analysis of Variance. It is noteworthy however, when considering the means (Table 13), that the mean for Atheists was quite the highest (4.000), followed by Conservative Hindus (3.5000) and Traditional Chinese (3.4286).

When each religious group was compared by t-test with the All Other group, significant differences were evident between Atheists and All Others in the Affective area, and between Liberal Christians and All Others in the Affective area, Policy area and Philosophy area. There was a significant difference also between Muslims and All Others and Conservative Muslims and All Others in the Knowledge area.

Table 14 ranks Religious Group responses in the categories of Affective, Policy, Philosophy, and Knowledge. The mean score for each Religious Group was ranked for each category of the questionnaire, with the mean for the entire category (the mean of all religious groups means) represented as a blank space. This blank space can be thought of as a fulcrum, upon which the weight of the Religious Group responses pivot.

It can be seen that for the first two categories of the questionnaire (Affective and Policy), a close juxtaposition of Conservative Christian responses and Atheist responses formed one end of the continuum. The other pole was anchored by a juxtaposition of Conservative Hindu and of Liberal Christian responses. For the Philosophy category, it was again the association of Conservative Christian and Atheist responses that formed what we might consider the conservative end of the continuum, with the liberal end anchored by the Liberal Christian group, with Conservative Muslims and Traditional Chinese.

TABLE 14

RANKING RELIGIOUS GROUP MEAN RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, KNOWLEDGE CATEGORIES

Rank	Affective	Rank	Policy	Rank	Philosophy	Rank	Knowledge
1	Conservative Hindu	1	Conservative Hindu	1	Conservative Muslim	1	Atheist
2	Conservative Muslim	2	Liberal Christian	2	Traditional Chinese	2	Conservative Hindu
3	Liberal Christian	3	Hindu	3	Liberal Christian	3	Traditional Chinese
4	Muslim	4	Liberal Muslim	4	Liberal Hindu	4	Liberal Christian
5	Liberal Muslim	5	Muslim	5	Hindu	5	Christian
6	Traditional Chinese	6	Liberal Hindu	6	Conservative Hindu	6	Conservative Christian
7	Christian	7	Christian	7	Muslim		
				8	Liberal Muslim	7	Hindu
8	Hindu	8	Conservative Muslim			8	Liberal Hindu
9	Liberal Hindu	9	Traditional Chinese	9	Christian	9	Conservative Muslim
10	Conservative Christian	10	Conservative Christian	10	Conservative Christian	10	Muslim
11	Atheist	11	Atheist	11	Atheist	11	Liberal Muslim

The position of the mean on the chart is left blank.

On the Knowledge portion of the survey, things flip-flopped. Atheist responses were highest and best-informed, and Conservative Christian responses were also found on that end of the continuum, although in last place (ranked 6th). The Liberal Christian Knowledge responses did not flip-flop however, as this group still ranked 4th. Conservative Hindu responses remained high as well, as this group ranked second in Knowledge.

When Hindus and Christians were not divided into conservative and liberal subgroups, Hindus scored higher in the Policy and Philosophy categories than Christians, but lower in the Affective and Knowledge categories. The hypothesis is accepted in the first two instances, not accepted in the last two.

Table 15 showed relationships between responses to item 30 on the survey; various categories of International Students, by Culture Area defined previously. An analysis of variance was performed for each of the categories of the survey (Affective, Policy, Philosophy, Knowledge) by each of the Culture Areas (American, Indian, Chinese, Mideast) that had sufficient respondents to work with. Since Latin America and Africa had only two respondents apiece, they were omitted from this consideration, as was Southeast Asia as it was deemed too heterogeneous in nature to yield meaningful "common-culture" data. A series of t-tests were also run in order to enlarge the categories by creating an All Other International group and an All Other group.

The analysis of variance revealed no significant differences between American respondents as a group and respondents from the India/Pakistan area, East Asian area, or Mideast area. There were no significant differences when the Indian category was compared with the others, nor when the East Asian category was compared to the others, nor when the Mideast category was compared with the others.

However, when the t-tests were run, certain differences did emerge. East Asian students compared with All Other International Students (this group total

includes the African, Latin-American and South East Asia respondents) yielded a significant difference in the area of Policy, this at the 0.032 confidence level. The mean score of East Asia students (3.2889) is significantly lower than the International Student group as a whole (mean for Policy of 3.5278) as revealed in Table 16, which tabulates means and standard deviations within the four major areas of the questionnaire by Culture Area.

TABLE 15

DIFFERENCES BETWEEN CULTURE AREAS

	USA/Canada	India/Pakistan	East Asia	Middle East	All Other Internationals
USA/Canada					
India/Pakistan					
East Asia					
Middle East					
All Other Internationals			(2)		
All Other	(3) (4)				

Analysis of variance: Affective[1], Policy[2], Philosophy[3], Knowledge[4] by culture area.

Those differing by 0.05 confidence level or below have numbers corresponding to survey section.

Those differing at 0.05 level by t-test have numbers in parenthesis.

TABLE 16

MEANS AND STANDARD DEVIATIONS FOR RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, KNOWLEDGE CATEGORIES OF CULTURE AREAS

		◄—— 1-4 scale ——►						◄— 0-6 scale —►	
		Affective		Policy		Philosophy		Knowledge	
Culture Area	Count	Mean	SD	Mean	SD	Mean	SD	Mean	SD
US/Canada	98	3.3688	0.4550	3.4044	0.3400	3.2975	0.5260	3.4592	1.3329
India/Pakistan	20	3.4000	0.4718	3.4980	0.3378	3.4750	0.3945	2.8000	1.1050
East Asia	10	3.3143	0.2313	3.2889	0.2750	3.4125	0.4169	2.9000	1.1972
Mid East	6	3.5476	0.1670	3.4792	0.2225	3.5000	0.3260	2.3333	0.5164
All Internationals	45	3.4127	0.4010	3.4747	0.3140	3.4694	0.3960	2.6000	1.095
Total	143	3.383	0.4380	3.427	0.3330	3.352	0.4940	3.189	1.321

Another difference that was made apparent by the t-tests was between US/Canada Students and All Other Students, which in this case means the International Students as a group. This difference in responses was in regard to the Philosophy section of the survey, and was significant at the 0.033 level of confidence. The mean for US/Canada Students in the Philosophy section was 3.2975 compared to the All Other category's mean of 3.4694 (Table 16). The t-test also revealed a significant difference (Table 15) in the area of Knowledge between USA/Canada respondents and All Other Students. Here the means (Table 16) were 1.3329 for USA/Canada respondents and 1.095 for All Other Students.

Table 17 ranked Cultural Area responses in the categories of Affective, Policy, Philosophy, and Knowledge. The mean score for each Culture Area was ranked, for each category of the questionnaire, with the mean for the entire category (the mean of all area means) represented as a blank space. Again, this blank space can be thought of as a fulcrum, upon which the weight of the Culture Area responses pivot. It can be seen that for all categories of the questionnaire, Affective, Policy, Philosophy, and Knowledge, that the responses of the US/Canada group tended to counterbalance the responses of the remainder of the Culture Areas. It is apparent that for the first three categories, Affective, Policy, and Philosophy, the lower scores for the US/Canada group represented the conservative pole, the preponderance of International Students, the liberal pole. The hypothesis is accepted for these categories.

For categories Affective and Policy, the East Asian respondents demonstrated a mean score even more conservative than did the US/Canada group. Therefore, East Asia was grouped with US/Canada on the conservative side of the fulcrum for these categories. In the Philosophy subsection of the questionnaire, the East Asia respondents again were more conservative than any of the other International Students, but not so conservative as the US/Canada group. Hence they were on the other side of the fulcrum here. In terms of Knowledge scores, the US/Canada

TABLE 17

RANKING CULTURE AREA MEAN RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, AND KNOWLEDGE CATEGORIES

Rank	Affective	Rank	Policy	Rank	Philosophy	Rank	Knowledge
1	Mideast	1	India/Pakistan	1	Mideast	1	US/Canada
2	All Internationals	2	Mideast	2	India/Pakistan		
3	India/Pakistan	3	All Internationals	3	All Internationals	2	East Asia
				4	East Asia	3	India/Pakistan
4	US/Canada	4	US/Canada			4	All Internationals
5	East Asia	5	East Asia	5	US/Canada	5	Mideast

The position of the mean on the chart is blank.

group again resided on one side of the mean of means fulcrum, and all the International Students were on the other side. In this category US/Canada respondents ranked higher than all others, which is to say, they were better informed. The hypothesis is not accepted in this instance. Again, East Asia respondents most closely resembled the US/Canada group, being the second best informed group of respondents.

Further comparisons within this context of differences in responses due to Culture Area were made by utilization of the t-test. Several individual questions from the survey were lifted out and analyzed. These are among the questions identified in Tables 3, 4 and 5 in which the percentage in agreement with that item on the survey was below 80 percent. The following responses were divided into those that scored the item with a 4 (strongly agree) and those that scored the item with a 1 or 2 (strongly disagree, somewhat disagree).

When International Students were confronted with question 6 (Table 18), "I have sometimes considered a particular tree as an old friend", significant differences ensued. Those that responded very positively to this item scored dramatically higher in the Affective and Policy portions of the questionnaire, this at the 0.000 and 0.002 confidence levels respectively. There was also a clear difference in the means of the two groups in regard to the Philosophy section, these considering trees as friends with a mean of 3.6328 and those not friendly with trees with a mean of 3.3942. This only became significant at the 0.113 level however. There was no statistical significance in the slight difference in knowledge demonstrated by the two groups, with those affirming a tree as an old friend slightly higher at a mean of 2.7500 and those not so affirming at a mean of 2.4615.

Table 19, concerned with Question 22, "I would consider tending a garden to be a 'spiritual' experience", also divided the International Students into groups whose responses to the questionnaire were significantly different. This difference

extended throughout the three areas of Affective, Policy, and Philosophy, at the 0.000, 0.000, and 0.000 levels respectively. Knowledge scores were not appreciably different for the two opposing groups in regard to question 22, although the mean for the "gardening is not spiritual" group was slightly higher at 2.8333 compared to 2.6000 for the "spiritual gardeners".

TABLE 18

AFFINITY FOR TREE DIFFERENCES IN SURVEY RESPONSE - INTERNATIONAL STUDENTS (QUESTION 6)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Tree Not Old Friend	13	3.1648	0.279	5.11	0.000 *
Tree Is Old Friend	16	3.7143	0.295		
Policy					
Tree Not Old Friend	13	3.3239	0.278	- 3.35	0.002 *
Tree Is Old Friend	16	3.6849	0.298		
Philosophy					
Tree Not Old Friend	13	3.3942	0.450	- 1.64	0.113
Tree Is Old Friend	16	3.6328	0.334		
Knowledge					
Tree Not Old Friend	13	2.4615	1.330	- 0.69	0.498
Tree Is Old Friend	16	2.7500	0.931		

* Probability < 0.05

TABLE 19

GARDENING AS SPIRITUAL DIFFERENCES IN SURVEY RESPONSE - INTERNATIONAL STUDENTS (QUESTION 22)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Gardening Is Not Spiritual	6	3.0238	0.277	-4.71	0.000 *
Gardening Is Spiritual	20	3.6429	0.284		
Policy					
Gardening Is Not Spiritual	6	3.1485	0.228	-4.60	0.000 *
Gardening Is Spiritual	20	3.6674	0.246		
Philosophy					
Gardening Is Not Spiritual	6	2.9167	0.342	-6.92	0.000 *
Gardening Is Spiritual	20	3.7562	0.235		
Knowledge					
Gardening Is Not Spiritual	6	2.8333	1.835	0.30	0.774
Gardening Is Spiritual	20	2.6000	0.883		

* Probability < 0.05

When International Students with High Knowledge (4 or 5 out of 6 answers correct) scores (derived from Questions 36-41) were compared with those with Low Knowledge scores (1-3 out of 6 answers correct) no significant differences emerged in the Affective or Policy areas, but significant differences were apparent for Philosophy (Table 20). The hypothesis is accepted in the first two instances, not accepted in the last. The mean for this category was 3.5515 for International

Students with Low Knowledge, and 3.2222 for International Students with High Knowledge. The difference was significant at the 0.024 level of confidence.

TABLE 20

KNOWLEDGE LEVEL DIFFERENCES IN SURVEY RESPONSE - INTERNATIONAL STUDENTS (QUESTIONS 36-41)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Low Knowledge	34	3.4328	0.394	0.03	0.978
High Knowledge	9	3.4286	0.440		
Policy					
Low Knowledge	34	3.5061	0.311	1.32	0.195
High Knowledge	9	3.3488	0.347		
Philosophy					
Low Knowledge	34	3.5515	0.372	2.34	0.024 *
High Knowledge	9	3.2222	0.389		

* Probability < 0.05

Several questions on the survey were similarly examined to explore relationships among American (US/Canada) Students. Interestingly, with rare exceptions, the sexual dichotomy showed more significant differences in responses than any other (Table 21). When male and female American Students

TABLE 21

GENDER DIFFERENCES IN SURVEY RESPONSE - US/CANADA

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Male	47	3.2492	0.464	-2.57	0.012 *
Female	51	3.4790	0.422		
Policy					
Male	47	3.3301	0.395	-2.08	0.041 *
Female	51	3.4730	0.266		
Philosophy					
Male	47	3.1283	0.597	-3.15	0.002 *
Female	51	3.4534	0.396		
Knowledge					
Male	47	3.6809	1.235	1.59	0.114
Female	51	3.2549	1.398		

* Probability < 0.05

were compared, statistically significant differences emerged within the areas of Affective, Policy, and Philosophy, but not in Knowledge. The hypothesis is accepted by this data in the first three instances, but not in the last. These first three differences were significant at the 0.012, 0.041, and 0.002 levels respectively. Thus, Affective and Philosophy differences between the sexes were emphatic. Policy differences, while significant, were less striking. The mean score for men on the Knowledge part of the test was 3.6809 (out of six possible correct) which was higher than the mean score for women (3.2549), but as was stated, this difference was not statistically significant.

The standard deviation pattern was interesting in Table 21, particularly in that we are dealing with nearly equal and sizable groups (47 male and 51 female). There was almost no difference in the standard deviation between men and women in the Affective area (0.464 and 0.422, respectively). Both varied less than one confidence interval between the four scoring possibilities of the category. With respect to the Policy section of the survey, males varied by 0.395, females by 0.266. Again, the variation was small in terms of the four possible responses. However, the women were appreciably closer to one another than were the men to one another in this area. This pattern was also apparent in the Philosophy section of the survey, although the uniformity of responses was considerably less here than for Policy. Men varied by 0.597, whereas women only by 0.396 with respect to Philosophy. On the Knowledge portion of the questionnaire, which had 6 responses rather than the 4 of the other survey segments men varied by 1.235 points; women varied by a very similar 1.398 points.

When American Students with High Knowledge scores, a group derived from Questions 36-41, (4 or 5 out of 6 answers correct) were compared with those with Low Knowledge scores (3 or less out of b answers correct), no significant differences emerged (Table 22). The hypothesis is accepted. The means were very close in this instance.

TABLE 22

KNOWLEDGE LEVEL DIFFERENCES IN SURVEY RESPONSES - US/CANADA (QUESTIONS 36-41)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Low Knowledge	45	3.3302	0.412	-0.96	0.340
High Knowledge	51	3.4174	0.472		
Policy					
Low Knowledge	45	3.3990	0.358	-0.15	0.878
High Knowledge	51	3.4099	0.332		
Philosophy					
Low Knowledge	45	3.3368	0.455	0.59	0.560
High Knowledge	51	3.2745	0.586		

The standard deviations were also quite similar across the board. The High Knowledge group tended to vary a bit more than the Low Knowledge group, especially in regard to Philosophy. However, the High Knowledge group varied a bit less than the other with respect to Policy. Both groups varied less in their evaluation of the Policy category of the questionnaire than they did with respect to the Affective and Philosophy components. There was more spread of opinion in both High and Low Knowledge groups in Philosophy than in any other area.

When American Hunters versus Non-Hunters were compared, no significant differences emerged (Table 23). Again, the means were extremely close. The only one that catches the eye was a mean for the Knowledge component of the

questionnaire of 3.6667 for Hunters and 3.4286 for Non-Hunters. This apparent difference can be explained simply by chance, however, as the t-test made clear.

TABLE 23

HUNTER/NON-HUNTER DIFFERENCES IN SURVEY RESPONSE - US/CANADA (QUESTION 3)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Hunter	24	3.3512	0.379	0.14	0.891
Non-Hunter	49	3.3353	0.501		
Policy					
Hunter	24	3.3513	0.292	-0.50	0.620
Non-Hunter	49	3.3919	0.343		
Philosophy					
Hunter	24	3.2589	0.453	0.00	0.998
Non-Hunter	49	3.2585	0.623		
Knowledge					
Hunter	24	3.6667	1.204	0.75	0.456
Non-Hunter	49	3.4286	1.307		

In every case, Affective through Knowledge, the Hunter group showed a smaller standard deviation than did the Non-Hunter group. However, these differences are very slight. The hypothesis is accepted for Philosophy, not accepted for Affective, Policy and Knowledge.

As with the International Students, when American Students were confronted with question 6 "I have sometimes considered a particular tree as an 'old friend'", radical differences became apparent (Table 24). Those who stated that they had been "friendly" with a tree demonstrated more sympathetic responses to nature in each category of Affective, Policy, and Philosophy than those who had no such feeling for trees - and this at the 0.000 level for each. Although there was not a statistically significant difference at the 0.05 level in responses on the Knowledge component of the test, the "old friend" group scored an apparently higher mean of 3.7500 as opposed to the "not old friend" mean of 3.1765.

For the subjective portions of the questionnaire (Affective, Policy, and Philosophy) the standard deviations of the "old friend" group were noticeably lower than the "not old friend" group, indicating not only considerable equanimity of opinion, but suggesting also that this one factor has a high predictive quality. This is suggested also by the extreme significance of the responses - all at the 0.000 level.

Differences were also apparent in regard to question 15 (Table 25), "Government has set aside enough land for preservation in your country". Again, a dramatic difference ensued among respondents in each of the first three categories of the test, all at the 0.000 level, with those feeling not enough land had been set aside scoring much more sympathetically to nature. Knowledge means were higher for those feeling that enough land had already been set aside however, but this difference was significant only at the 0.364 level. Again, the standard deviations were less for those feeling not enough land had been set aside than for those who felt enough land had been set aside.

TABLE 24

AFFINITY FOR TREE DIFFERENCES IN SURVEY RESPONSE - US/CANADA (QUESTION 6)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Tree Not Old Friend	34	2.9034	0.367	-12.27	0.000 *
Tree Is Old Friend	24	3.8214	0.199		
Policy					
Tree Not Old Friend	34	3.2063	0.394	- 4.90	0.000 *
Tree Is Old Friend	24	3.6214	0.251		
Philosophy					
Tree Not Old Friend	34	2.9321	0.612	- 5.97	0.000 *
Tree Is Old Friend	24	3.6354	0.263		
Knowledge					
Tree Not Old Friend	34	3.1765	1.381	- 1.58	0.119
Tree Is Old Friend	24	3.7500	1.327		

* Probability < 0.05

TABLE 25

GOVERNMENT LAND PRESERVATION DIFFERENCES IN SURVEY RESPONSE - US/CANADA (QUESTION 15)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Enough Set Aside	33	3.2251	0.433	-4.08	0.000 *
Not Enough Set Aside	26	3.6374	0.314		
Policy					
Enough Set Aside	33	3.1776	0.305	-7.05	0.000 *
Not Enough Set Aside	26	3.6451	0.202		
Philosophy					
Enough Set Aside	33	3.0694	0.621	-3.76	0.000 *
Not Enough Set Aside	26	3.5707	0.398		
Knowledge					
Enough Set Aside	33	3.8182	1.236	-0.92	0.364
Not Enough Set Aside	26	3.5385	1.067		

* Probability < 0.05

Question 22 (I would consider tending a garden to be a 'spiritual' experience) was another that divided the group of American Students sharply (Table 26). Significantly higher means in the direction of a positive response to nature were recorded by those who agreed with this statement. The categories Affective, Policy, Philosophy all demonstrated statistical differences at the 0.000 level. Those who felt the act of gardening had a spiritual significance to them scored a

TABLE 26

GARDENING AS SPIRITUAL DIFFERENCES IN SURVEY RESPONSE - US/CANADA (QUESTION 22)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Gardening Is Not Spiritual	33	3.0087	0.461	-6.61	0.000 *
Gardening Is Spiritual	26	3.6758	0.312		
Policy					
Gardening Is Not Spiritual	33	3.1928	0.377	-4.56	0.000 *
Gardening Is Spiritual	26	3.5672	0.252		
Philosophy					
Gardening Is Not Spiritual	33	2.8240	0.573	7.48	0.000 *
Gardening Is Spiritual	26	3.6683	0.269		
Knowledge					
Gardening Is Not Spiritual	33	3.3939	1.298	-1.13	0.265
Gardening Is Spiritual	26	3.8077	1.524		

* Probability < 0.05

mean of 3.8077 on the True/False test, those who felt no such spiritual significance scored a mean of 3.3939. Again, however, this was significant at only the 0.265 level. Also, as in the previous questions, the more liberal group was more focused than the more conservative group-in this case, those who did not consider gardening to be a spiritual experience. Standard deviations were markedly smaller for the "gardening is spiritual" group, except in the area of Knowledge. Here, although the "spiritual gardeners" scored higher (with a mean of 3.8077 as opposed to 3.3939), their standard deviation was also higher (1.524 compared to 1.298).

In relation to age of respondents in Question 27 (Table 27), those who were less than thirty years of age scored significantly less on the Affective scale than did those thirty or more years of age. This was true at the 0.026 level of significance. Otherwise, in comparing these two age groups, there were no statistically significant differences. The hypothesis is accepted for Affective and Knowledge, not accepted for Policy and Philosophy.

In only one instance in all of these comparisons was there a statistically significant difference in the Knowledge scores between two contrasting groups. This occurred when questions 6 and 22 were combined (Table 28) and scores for these two independent variables treated as one. In this case, significant differences were recorded between those who both "have sometimes considered a particular tree as an old friend" and "considered tending a garden to be a spiritual experience", and those who were not "friends" with trees or had not experienced spiritual moments in the garden. These differences in the strength of a positive response towards nature were apparent at the 0.000 level for Affective, 0.001 level for Policy and 0.000 level for Philosophy. The difference was also statistically significant at the 0.049 level for Knowledge with the group friendly to trees and "worshiping" in the garden demonstrating a mean response to the

True/False test of 4.1667 compared to the other group's mean response of 3.3605. The standard deviations were smaller as a whole for the more liberal group here than in any other comparison, indicating great unanimity of opinion of this group of twelve respondents.

TABLE 27

AGE DIFFERENCES IN SURVEY RESPONSE - US/CANADA (QUESTION 27)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
< 30 Years Old	48	3.2649	0.412	-2.26	0.026 *
30+ Years Old	50	3.4689	0.476		
Policy					
< 30 Years Old	48	3.3993	0.292	-0.15	0.884
30+ Years Old	50	3.4094	0.383		
Philosophy					
< 30 Years Old	48	3.2267	0.506	-1.31	0.193
30+ Years Old	50	3.3655	0.541		
Knowledge					
< 30 Years Old	48	3.5208	1.304	0.45	0.656
30+ Years Old	50	3.4000	1.370		

* Probability < 0.05

TABLE 28

GARDEN SPIRITUALITY AND TREE FRIENDSHIP
DIFFERENCES IN SURVEY RESPONSES -
US/CANADA (QUESTIONS 6 AND 22)

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Group 1	12	3.8690	0.215	7.32	0.000 *
Group 2	86	3.2990	0.436		
Policy					
Group 1	12	3.6918	0.240	3.28	0.001 *
Group 2	86	3.3643	0.333		
Philosophy					
Group 1	12	3.7708	0.249	5.91	0.000 *
Group 2	86	3.2315	0.521		
Knowledge					
Group 1	12	4.1667	1.337	1.99	0.049 *
Group 2	86	3.3605	1.310		

Group 1 - agrees with the notions that trees can be old friends and gardening has a spiritual dimension.

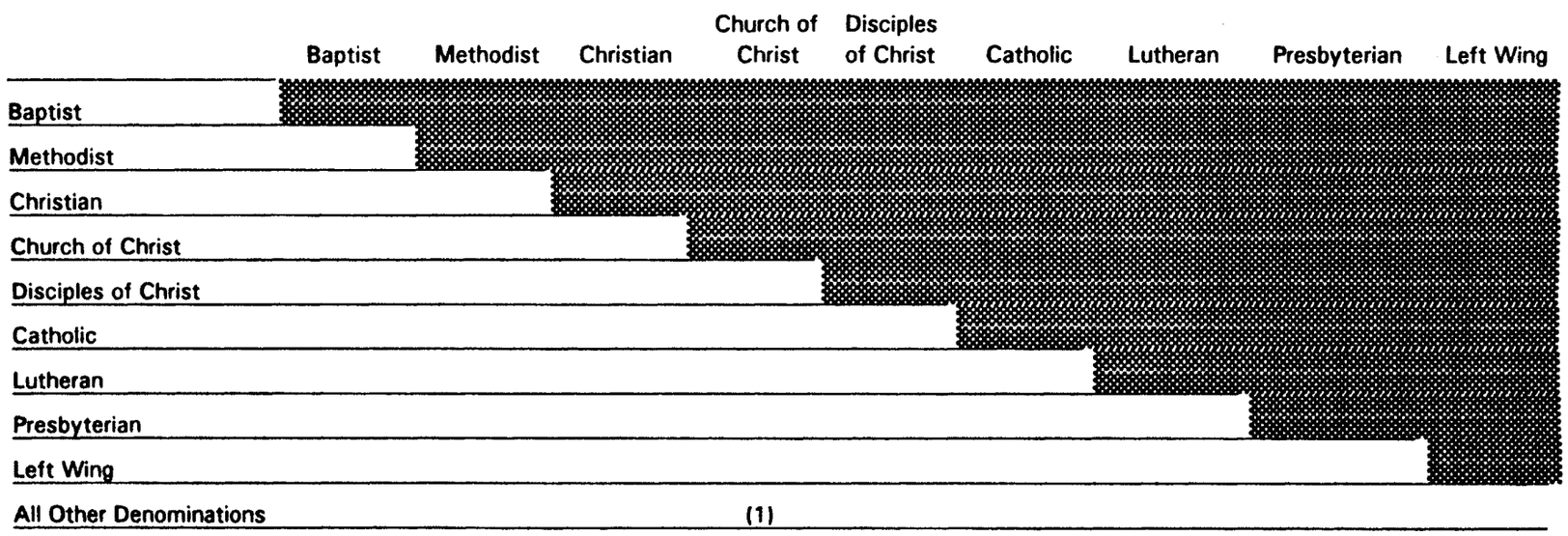
Group 2 - disagrees with the above notions.

* Probability < 0.05

Table 29, explored further the religious dimension of American respondents' choices on the questionnaire. An analysis of variance procedure was performed for each of the categories of the survey (Affective, Policy, Philosophy, Knowledge) by each of the major denominations indicated by American Students on item 31 of

TABLE 29

DIFFERENCES BETWEEN DENOMINATIONS US/CANADA



Analysis of variance: Affective[1], Policy[2], Philosophy[3], Knowledge[4] by religious denomination.

Those differing by 0.05 confidence level or below have numbers corresponding to survey section.

Those differing at 0.05 level by t-test have numbers in parenthesis.

the questionnaire. These included Baptist (with 16 respondents), Methodist (16), Christian (4), Church of Christ (5), Disciples of Christ (5), Catholic (15), Lutheran (5), Presbyterian (6) and a composite group, dubbed Left Wing (4) which included Unitarian (1), Agnostic (1), Christian Scientist (1), and Pantheist (1). A series of t-tests were made in order to include matching each of the above denominational groupings with all the other groups. This final category was termed All Other Denominations.

The analysis of variance revealed no significant statistical differences between any one of the groups and any of the other groups. When each denomination was compared to All Other Denominations with t-tests however, a significant difference was noted between respondents from the Church of Christ and all the other respondents in the area of Affective. The mean for the Church of Christ group was 2.9714 whereas the mean for All Other Denominations was 3.4138 (Table 30). This difference was significant at the 0.031 level. Although not significant at the 0.05 level, the difference between Church of Christ respondents and All Others was noticeable in the area of Philosophy as well. The mean for Church of Christ here was 3.0500 compared to All Others at 3.3650 (Table 30).

Table 31 ranked denominational responses in the categories of Affective, Policy, Philosophy, and Knowledge. The mean score for each denominational group was ranked, for each category of the questionnaire, with the mean for the entire category (the mean of all denominational means) represented as a blank space. Once again, this blank space can be conceived of as a fulcrum, upon which the weight of the denominational responses pivot.

For all categories of the questionnaire, Affective, Policy, Philosophy, and Knowledge, it is apparent that responses from the Church of Christ group represented the conservative pole. In fact, for the first three categories, the Church of Christ was last, ranking third from last (7th) in the Knowledge

TABLE 30

MEANS AND STANDARD DEVIATIONS FOR RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, KNOWLEDGE CATEGORIES OF DENOMINATIONS US/CANADA

		◄—— 1-4 scale ——►						◄— 0-6 scale —►	
		Affective		Policy		Philosophy		Knowledge	
Denominations	Count	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baptist	16	3.4107	0.4574	3.5093	0.3994	3.3297	0.4410	3.4375	1.2093
Methodist	16	3.4196	0.3277	3.3872	0.3040	3.2656	0.4155	3.8750	1.0878
Catholic	15	3.4095	0.4143	3.5241	0.3052	3.3393	0.4968	3.2000	1.2071
Lutheran	5	3.3429	0.4238	3.4667	0.0930	3.3250	0.4384	3.8000	0.8367
Christian	4	3.3571	0.7781	3.4722	0.1898	3.5000	0.6038	3.0000	2.5820
Disciples	5	3.6571	0.1629	3.3111	0.2876	3.5750	0.2092	4.0000	1.8708
Church of Christ	5	2.9714	0.4333	3.2667	0.4275	3.0500	0.6766	3.2000	1.3038
Presbyterian	6	3.5476	0.3661	3.4630	0.3097	3.5208	0.3393	3.8333	1.1690
Left Wing*	4	3.5357	0.3168	3.5139	0.2097	3.5313	0.3590	2.5000	0.5774
All Above Denominations	76	3.4098	0.4162	3.4493	0.3138	3.3502	0.4475	3.4868	1.2806

Left Wing designates: Agnostic, Christian Science, Pantheist, Unitarian

TABLE 31

RANKING DENOMINATIONAL MEAN RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, KNOWLEDGE CATEGORIES US/CANADA

Rank	Affective	Rank	Policy	Rank	Philosophy	Rank	Knowledge
1	Disciples of Christ	1	Catholic	1	Disciples of Christ	1	Disciples of Christ
2	Presbyterian	2	Left Wing	2	Left Wing	2	Methodist
3	Left Wing	3	Baptist	3	Presbyterian	3	Presbyterian
4	Methodist	4	Christian	4	Christian	4	Lutheran
5	Baptist	5	Lutheran				
		6	Presbyterian	5	Catholic	5	Baptist
6	Catholic			6	Baptist	6	Catholic
7	Christian	7	Methodist	7	Lutheran	7	Church of Christ
8	Lutheran	8	Disciples of Christ	8	Methodist	8	Christian
9	Church of Christ	9	Church of Christ	9	Church of Christ	9	Left Wing

The position of the mean on the chart is blank.

component of the survey. The pattern at the liberal end of the continuum was also clear. Here the Disciples of Christ group ranked first across the board with the exception of Policy responses, where this denomination plummets to second-to-last (8th). The Catholic group was highest in Policy, although seemingly middle-of-the-road in other survey categories. Associated with Disciples throughout in second or third place were typically the Presbyterian or Left Wing groups. The Left Wing group which ranked high in the first three categories of the survey does its own nose dive in relation to the Knowledge component of the questionnaire, dipping to last place (9th) among the denominations. The Disciples group and Presbyterian group maintained a liberal profile into the Knowledge portion of the survey, ranking first and third respectively.

Although students' self-professed religious orientation, whether liberal or conservative, was seen to be great significance as to how they responded to the questionnaire, an imposed breakdown of denominations (Table 32) into liberal and conservative groups demonstrated no statistically significant differences. The author assigned certain denominations (Baptist, Church of Christ, Christian, Church of God) as Conservative in this t-test and assigned others as Liberal (Methodist, Presbyterian, Reformed, Lutheran, Congregational, Church of the Brethren). This dichotomy was created on the basis of prevailing viewpoints in American society as to what constitutes "liberal" or "conservative" denominations. No significant differences emerged. The hypothesis is not accepted.

The final analysis of variance in this section (Table 33) was calculated for each of the categories of the questionnaire (Affective, Policy, Philosophy, Knowledge) by the primary major study groupings devised and illustrated in Figure 7 of this study. These groups were: Engineering (with 30 respondents), Agriculture (22), Education (25), Social Sciences (8), Business (12), Natural Sciences (14), History/Language (13), Math (8), and Home Economics (8). A

series of t-tests were made in order to include matching of each of the above Major Groups with all the other groups. This final category was termed All Other Majors.

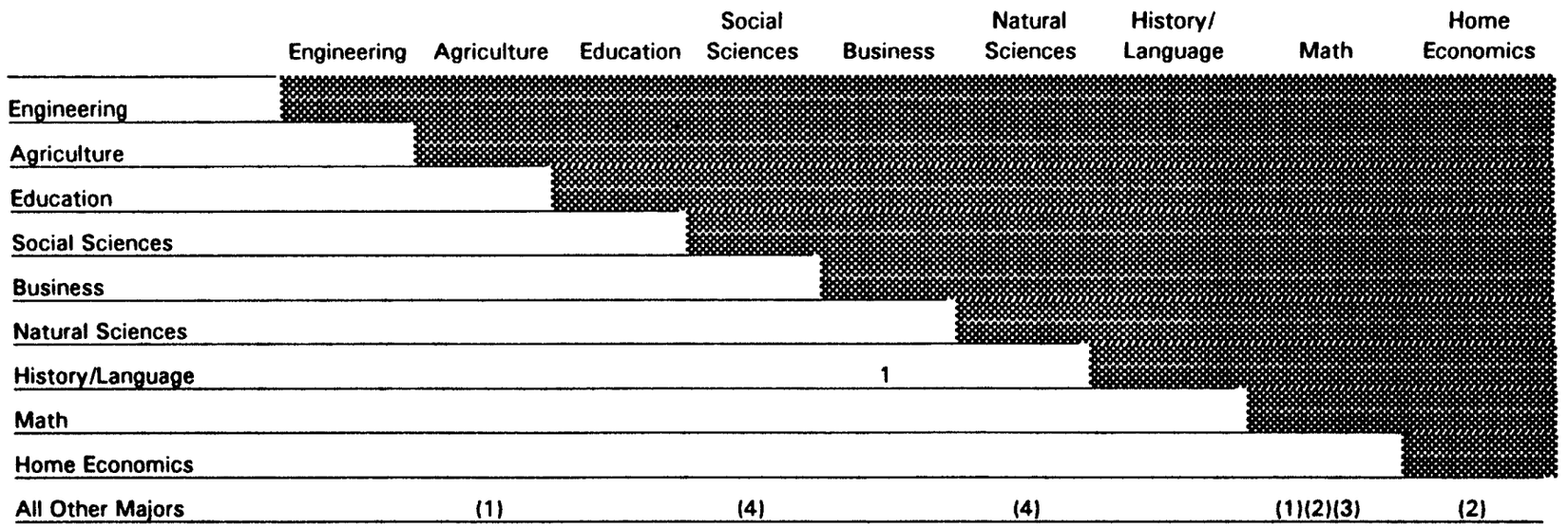
TABLE 32

FUNDAMENTAL/LIBERAL DIFFERENCES IN SURVEY RESPONSE - US/CANADA

Variable	Number of Cases	Mean	SD	t-value	2-tail Probability
Affective					
Fundamental	26	3.3077	0.449	-1.17	0.247
Liberal	30	3.4429	0.415		
Policy					
Fundamental	26	3.3665	0.309	-1.58	0.119
Liberal	30	3.5022	0.329		
Philosophy					
Fundamental	26	3.2837	0.503	-0.35	0.726
Liberal	30	3.3314	0.507		
Knowledge					
Fundamental	26	3.6154	1.388	0.05	0.964
Liberal	30	3.6000	1.133		

TABLE 33

DIFFERENCES BETWEEN ACADEMIC MAJOR GROUPS



	Engineering	Agriculture	Education	Social Sciences	Business	Natural Sciences	History/ Language	Math	Home Economics
Engineering									
Agriculture									
Education									
Social Sciences									
Business									
Natural Sciences									
History/Language					1				
Math									
Home Economics									
All Other Majors		(1)		(4)		(4)		(1)(2)(3)	(2)

Analysis of variance: Affective[1], Policy[2], Philosophy[3], Knowledge[4] by major group.

Those differing by 0.05 confidence level or below have numbers corresponding to survey section.

Those differing at 0.05 level by t-test have numbers in parenthesis.

The analysis of variance revealed few statistically significant differences among the groups. There was, however, a difference in the Affective area between the Business and History/Language respondents. The mean for Affective scored by Business respondents was 3.1667, whereas the mean for the History/Language respondents was 3.7143 (Table 34). (The mean for Affective for the Math respondents was even lower, 3.1429, but due perhaps to the small number of Math respondents (8) this failed to register a significant difference on the analysis of variance.)

The t-tests did reveal significant differences in the area of Affective between Math majors and All Other majors, with Math majors demonstrating a mean of 3.1429 (Table 34) whereas the mean of the means in the area of Affective was 3.3806. The t-tests (Table 33) revealed another significant difference in the Affective area, here between Agriculture majors and All Other majors. The mean for Agriculture students was higher at 3.5844 for all respondents, 3.3806 (Table 34).

History/Language respondents with an Affective mean of 3.7143 also varied from the group Affective mean of 3.3806, but this difference did not register on the t-test, perhaps due to the smaller number (13) of History/Language respondents.

The t-tests (Table 33) revealed significant differences in the Policy area between Math majors and All Other majors, and between Home Economics majors and All Other majors. The Math major mean was a low 3.3142 (Table 34), Home Economics was high at 3.5655 and the mean of means was 3.4270. Math majors differed significantly from All Other majors in the Philosophy subsection of the survey as well. Here (Table 34), Math majors' mean was low at 3.1719, whereas the mean of means was 3.3511.

TABLE 34

MEANS AND STANDARD DEVIATIONS FOR RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, KNOWLEDGE CATEGORIES OF ACADEMIC MAJOR GROUPS

		◄—— 1-4 scale ——►						◄— 0-6 scale —►	
		Affective		Policy		Philosophy		Knowledge	
Major Group	Count	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Engineering	30	3.2857	0.4804	3.3996	0.3195	3.3125	0.5062	2.6333	1.2172
Agriculture	22	3.5844	0.3412	3.4880	0.2940	3.4205	0.4129	3.5909	1.3683
Education	25	3.3429	0.4442	3.3550	0.3060	3.3636	0.3987	2.9600	1.3687
Social Sciences	8	3.4464	0.4000	3.5521	0.3059	3.5781	0.3776	2.6250	0.7440
Business	12	3.1667	0.4469	3.2801	0.4136	3.1583	0.4794	3.6667	1.1547
Natural Sciences	14	3.3571	0.4544	3.3512	0.4311	3.0744	0.8188	3.9286	1.4392
History/Language	13	3.7143	0.2542	3.6496	0.2519	3.6250	0.2887	3.2308	1.2352
Math	8	3.1429	0.3894	3.3142	0.1755	3.1719	0.5861	3.2500	0.8864
Home Economics	8	3.2857	0.4829	3.5655	0.3496	3.5469	0.2830	2.7500	1.4880
Total	140*	3.3806	0.4418	3.4270	0.3329	3.3511	0.4993	3.1571	1.3155

* Three respondents' majors are missing

Finally, the t-tests demonstrated differences at the 0.05 significant level or below in the area of Knowledge. Here Natural Science majors scored significantly higher on the True/False questions than did the group of respondents as a whole. The Natural Science Major mean for Knowledge was a high 3.9286, whereas the mean of means was only 3.1571. There was a significant difference also between the group mean and the low mean for Social Science majors, 3.1571 compared to only 2.6250 (Table 34). Engineers also varied significantly from the group with a low mean of 2.6333 on the True/False portion of the survey, compared to the mean of means of 3.1571.

Table 34 demonstrated differences that the analysis of variance did not register. In the Affective area the highest mean score was from the History/Language group of majors as we have seen. This mean was 3.7143 on the 4-point scale, compared with the mean of the entire population of 3.3806. The lowest standard deviation (0.2542) was recorded by this group, indicating a certain unanimity in their favorable evaluation of questions in the Affective group and their feelings of closeness to nature. The second highest mean was demonstrated by the Agriculture majors (3.5844). The second lowest standard deviation was also recorded by this group as well (0.3412), again demonstrating more cohesiveness in responding favorably to questions eliciting feelings for nature than the remaining groups. The only other Major Groups scoring above the population's mean for the Affective category were Social Science students, with a mean of 3.4464 and a standard deviation of 0.4000.

The lowest major group's scores in the Affective area were from Math majors (3.1429). Business students also scored this section low, with a mean of 3.1667. The standard deviation of 0.4469 for this group however, showed a rather wide range of opinion. Engineers soon followed with a mean of only 3.2857. Home Economics students tied with engineers with a mean of 3.2857. However, this

group demonstrated the largest standard deviation of the major groupings in relation to Affective responses. Their 0.4829 standard deviation indicates a fairly wide disparity of opinion within the group, as does the standard deviation of 0.4804 for engineers.

In regard to the Policy category of the questionnaire, again the History/ Language majors showed the highest mean evaluation of the questions. Again, a low standard deviation of 0.2519 indicated considerable agreement within the group. Second highest in their evaluation of Policy were Home Economics majors with a mean of 3.5655. Just behind came the Social Science majors. This group of majors averaged 3.4880 on this Policy category of the questionnaire. The other Major Group scoring above the mean of 3.4270 were Agriculture students (3.4880). The standard deviation of 0.2940 indicated general agreement among Agriculture respondents on questions of policy.

Scoring lowest on the Policy category of the questionnaire were the Business group of students. Next lowest in evaluation of Policy questions were the Math group (3.3142), again with a low standard deviation of 0.1755 that indicates unanimity of opinion.

The Philosophy category of the questionnaire had a lower mean (3.3511) and a higher standard deviation (0.4993) than the other two sections, indicating both less agreement and more spread in opinion. Highest scorers again were the History/Language group of students (3.6250). Again, a low standard deviation (0.2519) indicated broad agreement in evaluation of the Philosophy questions among this group. Social Science students (3.5781) just barely edged out Home Economics students (3.5469) for second and third place. The standard deviation of 0.2830 indicated a high degree of agreement among the Home Economic students in their area. Scoring lowest on the Philosophy subsection of the test were again the perennial doubters, the Business majors (3.1583) and the Math

majors (3.1719). But the lowest (3.0744) were Natural Science majors, a surprising development.

In regard to the last category of the survey, that of Knowledge, the highest mean score was scored by respondents from the Natural Science group of majors (3.9286). Business majors were next (3.6667), followed by Agriculture majors (3.5909). Scoring the lowest on Knowledge were those in Social Sciences (2.6250) - and this group was unanimously low with a standard deviation of only 0.7440 on the 6-point scale of this category.

Table 35 ranked Major Group responses in the categories of Affective, Policy, Philosophy, and Knowledge. The mean score for each Major Group is ranked, for each category of the questionnaire, with the mean for the entire category (the mean of all Major Group means) represented as a blank space. Again, this blank space can be thought of as a fulcrum, upon which the weight of the Major Group responses are balanced.

For the first three (subjective) categories of the questionnaire, Business and Math majors predominate on the conservative end of the continuum. With respect to Policy and Philosophy sections, Natural Science majors joined these first two with uniformly low scores. Two of these, Natural Science and Business, moved into first and second place (in that order) on the Knowledge portion of the survey.

Those majors scoring the questionnaire positively in the areas of Affective, Policy, and Philosophy included History/Language majors, who were first in each of these categories, and Social Science and Agriculture majors. It is relevant to note that although History/Language and Social Science majors demonstrated high mean scores for the subjective portions of the survey, both of these groups fell to lower means on the Knowledge portion of the questionnaire, especially Social Science majors who ranked last in the Knowledge category. However, Agriculture majors, who ranked second in Affective means among all the majors, and fourth in

majors (3.1719). But the lowest (3.0744) were Natural Science majors, a surprising development.

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TABLE 35

RANKING ACADEMIC MAJOR GROUP MEAN RESPONSES IN AFFECTIVE, POLICY, PHILOSOPHY, KNOWLEDGE CATEGORIES

Rank	Affective	Rank	Policy	Rank	Philosophy	Rank	Knowledge
1	History/Language	1	History/Language	1	History/Language	1	Natural Sciences
2	Agriculture	2	Home Economics	2	Social Sciences	2	Business
3	Social Sciences	3	Social Sciences	3	Home Economics	3	Agriculture
		4	Agriculture	4	Agriculture	4	Engineering
4	Natural Sciences			5	Education	5	Math
5	Education	5	Engineering			6	History/Language
6	Engineering	6	Education	6	Engineering		
7	Home Economics	7	Natural Sciences	7	Math	7	Education
8	Business	8	Math	8	Business	8	Home Economics
9	Math	9	Business	9	Natural Sciences	9	Social Sciences

The position of the mean on the chart is left blank.

both Policy and Philosophy, maintained high scores in the Knowledge category, ranking third. School of Agriculture respondents were thus above the mean in all areas of the survey. The hypothesis is accepted for Affective and Knowledge; not accepted for Policy and Philosophy.

CHAPTER V

MAJOR FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Major Findings of the Study

This section presents findings of this study which relate to the hypotheses prompted by the review of literature. First, in relation to gender differences,Table 21 demonstrated that female respondents were considerably more likely to relate in a strong and personal way to nature as represented by trees than were male respondents. Based on the literature review, this was to be anticipated. One wonders whether this is a learned response by females in various cultures, or something rather innate in women as compared to men. Research into the "why" of the female feeling for nature would be instrumental in solving this question, and in throwing light upon the notion that there may reside in human genetic makeup some sort of "native" affinity for nature. The female respondents' positive feeling for nature was also evident in significantly higher scores in the area of Policy and (especially) Philosophy.

However, this study could not confirm that men are better informed about nature/trees than women. Although the mean Knowledge score was higher for men than women, there was no statistically significant difference in Knowledge between the sexes. This was something which the review of literature did not lead one to believe would be the case.

Age differences were important qualifying measures of how graduate students at Oklahoma State University responded to the questionnaire. Table 27 demonstrated that those US (and the one Canadian) students who were thirty or

above scored significantly higher in the Affective category of the survey than those who were less than thirty. Again, as with sex differences, age did not seem to play a noteworthy part in how informed a person was about natural processes as measured by the Knowledge category of the test. This finding complements other studies that indicate older people are more environmentally sensitive and aware than younger people. This study affirms that older students show more sensitivity to nature, but are not significantly different than younger persons with respect to their Philosophy or Policy scores.

This study sought to measure specifically what part high Knowledge of natural processes played in relation to a person's attitudes in the Affective, Policy, and Philosophy areas. Tables 20 and 22 demonstrated that those with high Knowledge scores were not closer to nature in a personal sense (Affective). Neither were these well-informed persons more willing to sacrifice GNP or private gain for the sake of preserving the environment (Policy), nor were they more likely to hold to a "green" environmental philosophy (Philosophy) than those who were less well informed. Among International Students, there was in fact a significant difference in Philosophy between those respondents with high Knowledge, and those with low Knowledge - with the less well informed group demonstrating higher Philosophy scores than the better informed! These findings stand in contrast to those previous studies which relate environmental knowledge very directly to a determination to protect the environment. This data suggests that high knowledge about natural processes may merely reflect information stored within a persons mind or technical ability. The data gives no reason to suppose that high degree of affinity with nature necessarily follows being environmentally "literate", nor does "green" philosophy, nor determination to protect the environment. Rather the data suggest that people act out of their feelings, that sensitivity for nature, a personal value, comes before information about nature in

protection of the environment.

Table 9 showed that respondents who stated they valued nature "very much" as opposed to those who stated they valued nature or "somewhat" or not at all, demonstrated a statistically overwhelming difference in not only personal attitude toward nature (Affective), but in relation to Policy and Philosophy as well. The data most definitely shows that those who claim to value nature very much do demonstrate a high resolve to protect the environment. It is noteworthy that there is no difference in Knowledge between the groups who were dramatically different in relation to the first three scales (Affective, Policy, Philosophy).

Table 11 indicated that those who considered themselves politically liberal scored conclusively higher in a protective-of-environment policy (Policy) than did those who labeled themselves as politically conservative. There was no statistically significant difference between the Knowledge of nature scores for these two groups, nor scores in Affective and Philosophy. This finding confirms earlier studies linking a political liberal stance with an environmental ethic.

Table 10 presented data related to respondents' religious outlook. The dichotomy is between those who consider themselves religously liberal as opposed to those who consider themselves religiously conservative. The differences in these two group's scores in the Affective, Policy, and Philosophy categories were marked; more so than for the two groups who differed politically, especially in the Affective and Philosophy areas. Those who consider themselves religiously liberal clearly relate personally very much closer to nature than those who are religiously conservative (Affective). The religiously liberal group demonstrates a much greater commitment to protect the environment, (Policy) and a much "greener" philosophy (Philosophy) than their religiously conservative contemporaries. Again, Knowledge scores are not significantly different between these two groups. This data also indicated that political views and religious viewpoints were not the same

thing. The study indicated that those who professed to be politically liberal demonstrated a higher resolve to protect the environment as evidenced by Policy scores than those who professed to be politically conservative. However, there was no statistical difference in the two groups' scoring of the Affective or Philosophy categories of the questionnaire. In distinction to this, those who professed to be religiously liberal demonstrated significantly higher Affective, Policy, and Philosophy scores than those who professed to be religiously conservative. The religious designation seemed to tap deeper and more far-reaching feelings than did the political.

Previous studies that have indicated a negative relationship between (Christian) religion and an environmental ethic have perhaps picked up only on conservative Christian religious predilections insofar as nature is concerned. It becomes apparent that when we talk about "Christian" responses to this survey we are not dealing with one thing, but two. Liberal Christians and conservative Christians were diametrically opposed in their responses to Affective, Policy, and Philosophy sections of the questionnaire. Only in relation to Knowledge scores was there a semblance of unity between these two groups. The common high knowledge scores seem to reflect a broad cultural similarity. (Indeed, the scores for US/Canada respondents were highest of any Culture Area in Knowledge (Table 15)). However, we see again that knowledge of facts about nature seems to be rather removed from what a person feels about nature (Affective) how a person thinks about nature (Philosophy), and what a person intends or hopes to do in relation to nature (Policy). The difference between conservative Christian responses in these areas and liberal Christian responses reveal a pronounced dichotomy between the way two apparently similar subsets of the American population view the world of nature and themselves in relation to that natural world.

Table 23 revealed surprising data about hunters as opposed to non-hunters. There is no hint of anything even approaching significant difference between these two groups on any variable. The conclusion is that hunters form a very representative sample of the general population. Scratch a hunter and you get a person - not a person who is a particular lover of nature, nor an inspired conservationist, nor a backwoods philosopher, nor someone any better informed about the environment than anyone else.

Table 14 indicated that persons from Hindu backgrounds were nearly as different from one another as are persons from Christian backgrounds. Liberal Hindus answered the questionnaire more like conservative Christians, and conservative Hindus seemed more like liberal Christians.

This may be explained by the suggestion that among these International Student groups, the liberals are perhaps younger and less rural-oriented than those who indicated they were conservative. Being "liberal" for these younger Hindus and Muslims then may be a measure of westernization, of removal from traditional religious values which have been formulating over nearly 4000 years in a rural context. It is perhaps these Western values which tended to limit the liberal Hindu or Muslim feeling for nature compared to the more conservative (read traditional and rural-oriented) Hindu and Muslim responding to the questionnaire.

In this study, conservative Christian attitudes toward nature (Affective), Policy in regard to nature, and a "green" Philosophy, are the antithesis of the rural-oriented, conservative Hindu group. However, the liberal Christian group occupies a position always near the conservative Hindu group of respondents. When Hindus and Christians were not divided into conservative and liberal subgroups, Hindus scored higher in the Policy and Philosophy categories than Christians, but lower in the Affective and Knowledge categories. The hypothesis is accepted in the first two instances, not accepted in the last two.

As we supposed, International Students did tend to demonstrate higher subjective scores on the questionnaire than did the group preponderantly from the US. Table 17 indicated that the US/Canada group was juxtapositioned opposite the International Students in all subjective areas, Affective, Policy, and Philosophy. Interestingly, the East Asia group was associated with the US/Canada group for Affective and Policy, and closest to them (although across the "fulcrum" of the mean of means) with respect to Philosophy. This relationship held true for Knowledge. The US/Canada group was most knowledgeable, with the East Asia group closest to them in Knowledge, but on the other side of the mean.

It was supposed to begin with that those from liberal denominations would score the questionnaire in a different and more positive manner than those from conservative denominations. Table 32 indicated that this was not the case. Denominational affiliation was seen to have little bearing on a persons' likelihood to score the questionnaire in one way or another. It seems that the various denominations simply do not attract or include people with definite similarities with respect to their orientation toward nature. People find themselves in different denominations on the basis of factors other than their feelings, intentions, philosophy and knowledge about nature.

It was hypothesized at the onset of the study that Agriculture majors might relate emotionally to nature rather strongly (Affective) and be highly informed (Knowledge), but mark the survey rather conservatively in terms of Policy and Philosophy questions. In fact the difference in feelings for nature showed up on the analysis of variance illustrated in Table 33. Agriculture majors scored significantly higher in the Affective area than All Other Majors. This was refreshing in that it belied the notion the agriculture students are rigidly mechanistic in their thinking and intent only upon despoiling natural resources rather than exhibiting feelings of closeness to nature.

However, Agriculture majors showed up on the positive side of the mean in relation to Policy and Philosophy questions as well, ranking fourth in both of these areas (Table 35). Finally, Agriculture majors were certainly knowledgeable, ranking third in the Knowledge area. This data presents a different picture of Oklahoma State University graduate students in the School of Agriculture than makes the press. We may have in our mind's eye a picture of the mindless "aggie", decked out in cowboy boots and sporting the requisite circular patch in the seat of (his) Levi's - mark of a confirmed and veteran tobacco chewer.

The real Agriculture major is proven to be well informed, yet not narrow and mechanistic in his thinking. Rather, a well-rounded person emerges; one with heart, with great feeling for the outdoors, a reasonable desire to protect as well as use the environment, and one whose philosophy incorporates much of his or her strong feeling for nature. This individual seems to have internalized the joys of agricultural life spoken of in the FFA creed.

Recommendations

Although Oklahoma State University School of Agriculture majors represented themselves well in this study, at the college level it seems largely by chance. The conditioning a farm boy or girl receives at home must surely play a very large part in their strong relationship with nature, conservation ethic and "green" philosophy. Experiences in high school which may have included taking part in an agricultural curriculum and participation in 4-H club or FFA are no doubt also of great importance. These organizations, and others, continue at the college level. Informal learning, learning by association with peers and professors, is a real possibility at the college level for a major in agriculture. However, the university curriculum speaks little of values. If in fact, as this study indicated, it is primarily values that drive a person's conservation ethic, then the university curriculum

needs to speak more of values. Therefore, I recommend that a course in the Philosophy of Agriculture be included in the curriculum and carry graduate credit. This course would examine the development of the agricultural ethic in this country - and critique it as well. There should be other voices than simply those of agribusiness evidenced in the course. Represented also should be small farmers, alternative agriculture, religious groups, American Indians, impoverished farmers in the Third World, sociologists...even poets. I further recommend that the School of Agriculture develop a course in "the Agricultural Landscape". This would be a class to be conducted largely outdoors. Small groups (perhaps labs) would simply get out and see what's going on outside, on the farm, and talk about it. They would look at conservation practices - but the class would focus on the "big picture", not simply techniques. Here the endeavor would be to come to appreciate a proper fit of human society and nature as evidenced (or not evidenced) by the agriculture in the area. Hopefully, these additions to the curriculum might speak to the whole person who is taking courses in the School of Agriculture, and aid in their development.

Recommendations for Additional Research

All areas of this study need to be researched more fully. There is hardly consensus in our society as to what is primary in guiding a person's choices, information or feelings. With respect to nature, that is an important question, as we are all related to the earth and the viability of earth's ecosystems. The distinction between religious views and political views needs more attention, as does the liberal/conservative dichotomy in religion, and the difference in perception between male and female. Polar groups talk "at" one another in our society, Congress is "dead-locked", and many important things don't happen because we can't "hear" or understand one another. Further research might illuminate our

differences, bringing about better communication and stewardship of the earth. The differences in national experiences is important, as our world grows smaller every day. Why is it that International Students seem to reverence nature more than many Americans, and are more committed to putting human designs in harmony with natural ones?

A "Green" Philosophy is perhaps something new in the United States, and as this survey indicated, something much more accepted by liberal Christians than conservative Christians. However, this rather humanistic view, a view advancing the notion that man is part and parcel of nature and not opposed to it, is a cultural view thousands of years old in India. In view of our present environmental crisis, the view seems valuable. What can we in the US learn from others in this regard?

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APPENDIX

INSTRUMENTS

INSTRUMENT

The first section of this questionnaire asks for your personal response to each statement. Please state whether you "strongly agree," "somewhat agree," "somewhat disagree," or strongly disagree."

1. I would like to plant a tree and see it grow.
2. I am sometimes struck by an individual tree's beauty when walking or driving by.
3. A forest-based activity that I particularly value is hunting.
4. I would enjoy walking along a well-kept path through a tall forest.
5. The loss of the ancient trees of the world's tropical and temperate rainforests would be felt as a personal loss by me.
6. I have sometimes considered a particular tree as an "old friend."
7. Knowing the names of the common trees of the place I consider home is important to me.
8. I would value the shade a tree gives a house enough to pay more for that house.
9. Wood-importing nations such as Japan and Britain should pay more for the wood they import.
10. Governments should provide legally mandated agricultural zoning based on scientific management considerations.
11. The use of sustainable agricultural methods such as contour plowing should be encouraged by government.
12. Lumber and pulp companies should plant as many trees as they harvest.
13. Multiple use of forest resources is an important conservation concept.
14. Tropical rainforest deforestation is an important issue for people in the U.S.A. and Europe.
15. Government has set aside enough land for preservation.
16. Government should devote resources to encourage small-scale agriculture.
17. Small farms in the Third World should be encouraged to play an increasing role in providing raw materials for future generations.
18. Nature is orderly.

19. Human alienation from the natural world is a major problem facing humankind.

20. Every form of life on the Earth has a value in itself.

21. People depend upon nature as much in an industrial economy as in an agricultural economy.

22. I would consider tending a garden to be a "spiritual" experience.

23. Transformation of nature to provide for humankind should be brought about with as little disruption as possible.

24. One might consider the interrelatedness of life forms "holy."

25. Respect for nature is a natural part of religious training.

Please respond to the following:

26. sex _____

27. age _____

28. major _____

29. religion _____

30. country of origin _____

31. denominational affiliation_____

32. I personally consider my religion:
    a) very valuable
    b) somewhat valuable
    c) not very valuable, non-existent or irrelevant

33. For me a feeling of closeness to nature is:
    a) very valuable
    b) somewhat valuable
    c) not valuable at all or irrelevant

34. I would describe my own religious outlook as:
    a) very conservative
    b) somewhat conservative
    c) somewhat liberal
    d) very liberal

35. I would describe my political views as:
    a) very conservative
    b) somewhat conservative
    c) somewhat liberal
    d) very liberal

Note: This next section tests knowledge, not opinion or feelings. If you agree with the statement, indicate "T." If you disagree with the statement, indicate "F." If you don't know, indicate "DK."

36. A leguminous tree supplies the soil with iron, a necessary nutrient. (true) T F DK

37. Trees serve as major storage places for carbon while supplying a major source of oxygen. (true) T F DK

38. Most of the nutrients in a tropical rainforest are in the rich fertile soil which lies beneath the vegetation. (false) T F DK

39. Tree roots form necessary working partnerships with other organisms, including many forms of fungi. (true) T F DK

40. Many of the large trees of a virgin tropical rainforest produce heavy seeds or large fruits. (true) T F DK

41. A palm tree is classified as a herbivore. (false) T F DK

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
FOR HUMAN SUBJECTS RESEARCH

Date: 03-25-93 IRB#: AG-93-018

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Principal Investigator(s): James P. Key, Edley C. Felts

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

APPROVAL STATUS SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING.
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL. ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

PROVISIONS RECEIVED AND APPROVED

Signature: Marcia A. Tilley Date: March 29, 1993
Chair of Institutional Review Board

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Chair of Institutional Review Board

Date: March 29, 1993

VITA 2

Edley C. Felts

Candidate for the Degree of

Master of Science

Thesis: ENVIRONMENTAL ATTITUDES AS EVIDENCED IN PERCEPTIONS OF TREES BY GRADUATE STUDENTS AT OKLAHOMA STATE UNIVERSITY

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